

1
ADA109217

SUSQUEHANNA RIVER BASIN
EAST BRANCH TUNKHANNOCK CREEK
SUSQUEHANNA COUNTY

PENNSYLVANIA

LEVEL II

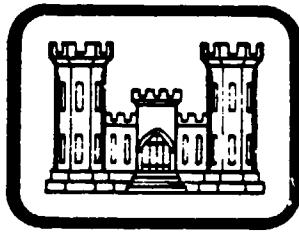
ROSS DAM

NDI ID NO. PA-00978
DER ID NO. 58-134

~~BRUCE E. & NANCY W. ROSS~~

DTIC
ELECTED
JAN 04 1982
S E D

PHASE I INSPECTION REPORT NATIONAL DAM INSPECTION PROGRAM



67
18
"Original contains color
plates: All DTIC reproductions
will be in black and
white"

DEPARTMENT OF THE ARMY
Baltimore District, Corps of Engineers
Baltimore, Maryland 21203

This document has been approved
for public release and sale; its
distribution is unlimited.

409111

81 12 28 255

SUSQUEHANNA RIVER BASIN
EAST BRANCH OF TUNKHANNOCK CREEK, SUSQUEHANNA COUNTY
PENNSYLVANIA

ROSS DAM

NDI ID No. PA-00978
DER ID No. 58-134

BRUCE E. & NANCY W. ROSS

PHASE I INSPECTION REPORT

NATIONAL DAM INSPECTION PROGRAM

| | |
|--------------------|-------------------------------------|
| Accession For | |
| NTIS GRAIL | <input checked="" type="checkbox"/> |
| DTIC TAB | <input type="checkbox"/> |
| Unannounced | <input type="checkbox"/> |
| JV Verification | <input type="checkbox"/> |
| <i>See on file</i> | |
| By _____ | |
| Distribution/ | |
| Availability Codes | |
| First | Available or Special |
| A | |

Prepared By:

DEPARTMENT OF THE ARMY
Baltimore District, Corps of Engineers
Baltimore, Maryland 21203

JUNE 1981

PREFACE

This report is prepared under guidance contained in the Recommended Guidelines for Safety Inspection of Dams, for Phase I investigations. Copies of these guidelines may be obtained from the Office of Chief of Engineers, Washington, DC 20314. The purpose of a Phase I investigation is to identify expeditiously those dams which may pose hazards to human life or property. The assessment of the general condition of the dam is based upon available data and visual inspections. Detailed investigation and analyses involving topographic mapping, subsurface investigations, testing, and detailed computational evaluations are beyond the scope of a Phase I investigation; however, the investigation is intended to identify any need for such studies.

In reviewing this report, it should be realized that the reported condition of the dam is based on observations of field conditions at the time of inspection along with data available to the inspection team.

It is important to note that the condition of a dam depends on numerous and constantly changing internal and external conditions, and is evolutionary in nature. It would be incorrect to assume that the present condition of the dam will continue to represent the condition of the dam at some point in the future. Only through frequent inspections can unsafe conditions be detected and only through continued care and maintenance can these conditions be prevented or corrected.

Phase I inspections are not intended to provide detailed hydrologic and hydraulic analyses. In accordance with the established guidelines, the spillway design flood is based on the estimated "Probable Maximum Flood" for the region (greatest reasonably possible storm runoff), or fractions thereof. The spillway design flood provides a measure of relative spillway capacity and serves as an aid in determining the need for more detailed hydrologic studies, considering the size of the dam, its general condition, and the downstream damage potential.

NDI ID No. PA-00978, DER ID No. 58-134

PHASE I INSPECTION REPORT

NATIONAL DAM INSPECTION PROGRAM

CONTENTS

| | <u>Description</u> | <u>Page</u> |
|---|--------------------|-------------|
| Brief Assessment of General Condition and Recommended Action..... | iii | |
| SECTION 1 - Project Information..... | 1 | |
| SECTION 2 - Engineering Data..... | 8 | |
| SECTION 3 - Visual Inspection..... | 10 | |
| SECTION 4 - Operational Procedures..... | 14 | |
| SECTION 5 - Hydrology and Hydraulics..... | 15 | |
| SECTION 6 - Structural Stability..... | 18 | |
| SECTION 7 - Assessment, Recommendations, and Proposed Remedial Measures..... | 21 | |

APPENDICES

| <u>Appendix</u> | <u>Title</u> |
|-----------------|-------------------------------|
| A | Checklist - Visual Inspection |
| B | Checklist - Engineering Data |
| C | Photographs |
| D | Hydrology and Hydraulics |
| E | Plates |
| F | Geology |

PHASE I INSPECTION REPORT
NATIONAL DAM INSPECTION PROGRAM
BRIEF ASSESSMENT OF GENERAL CONDITION
AND
RECOMMENDED ACTION

Name of Dam: Ross Dam
NDI ID NO. PA 00978
DER ID NO. 58-104

Size: Small (20.7 feet high; 70-acre-feet)

Hazard Classification: Significant

Owners: Bruce E. & Nancy W. Ross
Village Road
Green Village, New Jersey 07935

State Located: Pennsylvania

County Located: Susquehanna

Stream: East Branch of Tunkhannock Creek

Date of Inspection: 25 March 1981

The visual inspection and review of available design and construction data indicate that Ross Dam is in fair condition. The deteriorated condition of the spillway ways and the adjacent low areas of the embankment are the primary deficiencies which require maintenance work to assure the operational safety of this facility. In accordance with the recommended guidelines, the spillway design flood (SDF) for this facility is in the range of the 100 year flood to the 1/2 PMF. Based on the size of this dam and the degree of downstream hazard, the selected SDF is the 100 year flood.

- The hydrologic and hydraulic computations indicate that the combination of reservoir storage and spillway discharge capacity will pass the SDF (100 year flood) prior to overtopping the embankment. Therefore, in accordance with the criteria outlined and evaluated in Section 5.5 of this report, the spillway for Ross Dam is considered to be adequate.

The following recommendations should be implemented by the owner without delay:

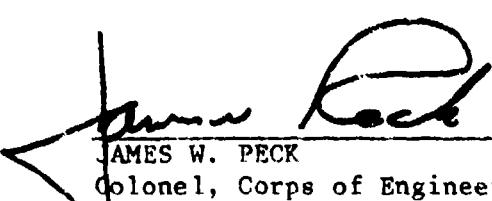
a. Necessary remedial measures should be implemented under the guidance of a qualified engineer to repair the deteriorated spillway walls and fill in the adjacent low areas of the embankment.

ROTS DAM

- b. The control rod for the outlet works slide gate control should be repaired prior to maintaining a permanent pool.
- c. Remove brush from embankment.
- d. The pipes on the spillway crest should be removed.
- e. A formal surveillance and downstream emergency warning system should be developed for use during periods of heavy or prolonged precipitation.
- f. An operation and maintenance manual or plan should be prepared for use as a guide in the operation and maintenance of the dam during normal and emergency conditions.
- g. A schedule of regular inspection by a qualified engineer should be developed.

APPROVED BY:

DEPARTMENT OF THE ARMY
BALTIMORE DISTRICT, CORPS OF ENGINEERS


JAMES W. PECK

Colonel, Corps of Engineers
Commander and District Engineer

DATE: 3 Aug 81

ROSS DAM



PHASE I INSPECTION REPORT
NATIONAL DAM INSPECTION PROGRAM

ROSS DAM

NDI ID No. PA 00978
DER ID No. 58-134

SECTION 1

PROJECT INFORMATION

1.1 General

a. Authority. The Dam Inspection Act, Public Law 92-367, authorized the Secretary of the Army, through the Corps of Engineers, to initiate a program of inspection of non-federal dams throughout the United States.

b. Purpose. The purpose of this inspection is to determine if the dam constitutes a hazard to human life and property.

1.2 Description of Project.

a. Description of Dam and Appurtenances. Ross Dam is an earthfill structure approximately 20.7 feet high and 286 feet in length (including spillway). The spillway is an uncontrolled concrete ogee weir located near the right abutment, and has a length of 35 feet between two concrete walls. A concrete stilling basin is located immediately downstream of the spillway weir. The outlet works consist of a 12 inch corrugated metal conduit with a slide gate control at the intake.

b. Location: Herrick Township, Susquehanna County, Pa.
U.S.G.S. Quadrangle - Clifford, Pa.
Latitude $41^{\circ} 44.3'$; Longitude $75^{\circ} 33.7'$
Refer to Plates I & II, App. E

c. Size Classification: Small: Height-20.7 feet, Storage-70 acre feet

d. Hazard Classification: Significant (Refer to Section 3.1.e)

e. Ownership: Bruce E. & Nancy W. Ross
Village Road
Green Village, New Jersey 07935

f. Purpose: Future Land Development

g. Design and Construction History:

The dam was designed by Mr. L. F. Burlein, P.E., Honesdale, Pa.

Construction was completed in November 1974.

A final inspection by PennDER on 9 December 1974 found the dam to have been constructed in a generally satisfactory manner; however, several items were noted for correction. The primary items noted included a need for riprap in the wastewater channel, a need to remove the fishscreen posts located across the spillway, and a need to get proper compaction of the backfill behind the spillway retaining walls. There is no evidence that the owner ever corrected these items.

h. Normal Operating Procedure

At the present time, the outlet works gate control is left in an open position and the lake is essentially drained except during periods of heavy rainfall. Inflow in excess of the outlet works capacity is stored until reaching the spillway crest. The excess will then flow over the uncontrolled ogee weir.

1.3 Pertinent Data

NOTE: Elevations are based on an assumed elevation of 1820.0 for the invert of the intake pipe. This datum was inferred from the elevations shown on the U.S.G.S. quad sheet (Plate E-II). The elevations shown on the design drawings are based on some other datum.

a. Drainage Area (square miles)

| | |
|---------------------------|------|
| From files: | 0.85 |
| Computed for this report: | 0.85 |
| Use: | 0.85 |

b. Discharge at Damsite (cubic feet per second)

| | |
|---|---------|
| Maximum known flood | Unknown |
| Outlet works with maximum pool (El. 1836.6) | 8 |
| Spillway with maximum pool (El. 1836.6) | 2,000 |

c. Elevations (feet above mean sea level)

Top of Dam

| | |
|------------------|---------|
| Design | unknown |
| Existing (Field) | 1836.6 |
| Normal Pool | 1820.0 |

| | |
|---|-------------------------------------|
| Spillway Crest | 1830.0 |
| Outlet Works | |
| Upstream invert | 1820.0 |
| Downstream invert | 1815.9 |
| Streambed at toe | 1815.9 |
| d. <u>Reservoir Length (feet)</u> | |
| Normal pool (El. 1820.0) | 0 |
| Spillway crest (El. 1830.0) | 1,200 |
| Maximum pool (El. 1836.6) | 2,200 |
| e. <u>Storage (acre-feet)</u> | |
| Normal pool (El. 1820.0) | 0 |
| Spillway crest (El. 1830.0) | 13 |
| Maximum pool (El. 1836.6) | 70 |
| f. <u>Reservoir Surface (acres)</u> | |
| Normal pool (El. 1820.0) | 0 |
| Spillway crest (El. 1830.0) | 4 |
| Maximum pool (El. 1836.6) | 15 |
| g. <u>Dam</u> | |
| Note: Refer to plates in Appendix E for plans and sections. | |
| <u>Type</u> | Homogeneous earthfill |
| <u>Length</u> | 286 feet (including spillway) |
| <u>Top Width</u> | 16.5 feet |
| <u>Height</u> | 20.7 feet |
| <u>Side Slopes</u> | |
| Upstream | 1V:2.5H (exist.); 1V:3H (design) |
| Downstream | 1V:2H (exist.); 1V:2.5H (design) |
| <u>Zoning</u> | None |

| | |
|--------------------------------|--|
| <u>Cutoff</u> | Trapezoidal trench 4 feet deep, 8 feet wide bottom |
| <u>Grouting</u> | None |
| h. <u>Outlet Works.</u> | |
| <u>Type</u> | 18 inch (Design) 12 inch (Existing) |
| <u>Closure</u> | Slide gate mounted on upstream end. |
| i. <u>Spillway</u> | |
| <u>Type</u> | Concrete ogee weir |
| <u>Location</u> | Near right abutment |
| <u>Length</u> | 35 feet (gross) 31.7 feet (effective) |
| <u>Crest Elevation</u> | 1830.0 msl |
| <u>Freeboard</u> | 6.6 feet |
| <u>Approach Channel</u> | Reservoir |
| <u>Downstream Channel</u> | Earth, cut in natural ground; dike on left |

SECTION 2
ENGINEERING DATA

2.1 Design.

The available data for Ross Dam consist of files provided by PennDER. Information available includes a permit application report, dated 27 August 1970, with a general description of the facility, PennDER inspection reports and various related correspondence. Specifications and drawings providing cross-sections, profiles and details of the dam are also available.

2.2 Construction.

Information concerning construction of the dam is limited to the correspondence contained in the PennDER files which indicated that the dam was built in general accordance with the plans and specifications.

2.3 Operation.

No formal records of operation or maintenance exist. The owner currently keeps the lake drawn down, with the exception of periods of heavy rainfall when inflow exceeds the outlet works capacity.

2.4 Evaluation.

a. Availability. All available written information was contained in the permit files provided by PennDER.

b. Adequacy. The available data, including that collected during the recent detailed visual inspection, are considered to be adequate to make a reasonable assessment of the dam.

SECTION 3

VISUAL INSPECTION

3.1 Observations

a. General. The overall appearance and general condition of Ross Dam is fair. Noteworthy deficiencies are described below. The visual inspection checklist and field sketch are provided in Appendix A. Photographs taken during the inspection are reproduced in Appendix C.

On the day of the inspection, no water was impounded and all inflow was discharging through the outlet works. The owner was not present during the inspection; however, his son, who lives nearby, was interviewed. He stated that no water is stored in the reservoir except briefly when the inflow exceeds the capacity of the outlet works. Mr. John Chernesky of PennDER was present during the inspection.

b. Embankment. The 16.5 foot wide embankment crest is approximately four feet higher than originally designed. The low point is located adjacent to the left spillway wall. The embankment is actually lower than the top of the wall at this point; however, flow is prevented from passing behind the spillway wall by a seepage cutoff wall which is equal in height to the spillway wall. According to design drawings, the seepage cutoff wall extends nine feet into the embankment. The horizontal alignment of the crest is good. Small trees and brush are growing on the upstream face above the spillway crest elevation. There is no riprap on the upstream face, although it was specified in the design drawings. No sloughing is evident on any portion of the embankment. The upstream slope is 1V:2.5H except near the toe where the slope flattens to 1V:4H. The downstream slope is 1V:2H. The embankment is reported to contain a toe drain with a discharge pipe through the outlet conduit headwall. This pipe was not found.

c. Appurtenant Structures. The spillway consists of a concrete ogee overflow weir with a concrete stilling basin and concrete walls. The walls extend 17 feet upstream and downstream of the weir. Ten steel pipes, 4 inches in diameter, are spaced across the crest of the weir. The spillway walls are severely cracked and spalled in several places. The seepage cutoff walls are broken at their junction with the spillway walls. The approach to the spillway is the reservoir and there are no obstructions. Downstream of the stilling basin the channel is cut in earth. An earth dike along the left side of the discharge channel protects the downstream face of the embankment from spillway flows. Approximately 200 feet downstream of the weir, the channel narrows to 12 feet in width and bends sharply to the left to join the original streambed. There is no erosion protection in the bottom or on the sides of the channel.

The outlet works appears to have been constructed in general accordance with the plans shown in Appendix E except that the outlet conduit is only 12 inches in diameter. The slide gate is in the open position. The control rod for this gate extends to the crest of the dam along the upstream slope.

Although supported in several locations along its length, the control rod is severely bent in two locations below the spillway crest. The cause of the deformation is reported to be ice forces. In this present condition the gate is essentially inoperable. The 12 inch corrugated metal conduit and the outlet structure are in good condition. The discharge channel is the original streambed with trees and brush along the banks.

d. Reservoir Area. The reservoir slopes are partially wooded and flat. There is no residential development on the reservoir slopes.

e. Downstream Channel. The dam is located on the East Branch of Tunkhannock Creek. The initial 2,500 feet of channel below the dam are confined with moderate side slopes and a narrow floodplain. The floodplain increases slightly in width for the next 0.5 mile before narrowing again and passing under Pennsylvania Legislative Route 57044 and Township Route T-470 approximately 1.4 miles downstream of the dam. One house is located within 40 feet of the streambed just upstream of LR 57044. The first floor of this structure is approximately 15 feet above streambed. About 4,000 feet further downstream, the channel is again confined and flows through an uninhabited area for the next two miles before crossing Legislative Route 57043. Two houses with first floors located six feet above streambed are within 75 feet of the stream and just downstream of L.R. 57043. Failure of Ross Lake Dam could cause property damage and the loss of a few lives at the first downstream residence due to backwater effects from the roadway crossings. This flood flow may also result in damage to these roads which are heavily traveled access roads to the Elk Mountain Ski Area and associated residential development. Additional property damage and loss of life may occur at the second downstream damage area should the dam fail. The downstream development is shown on Plate E-II. A significant hazard classification is appropriate for Ross Dam.

f. Evaluation. Since no permanent pool is presently impounded, this facility is evaluated as a dry lake. The primary concerns for the safety of this facility are the poor condition of the spillway walls and the low areas behind the left spillway wall. If a permanent pool is maintained in the future, the sluice gate control rod should be replaced such that it is protected from damage due to ice loading.

SECTION 4

OPERATIONAL PROCEDURES

4.1 Normal Operating Procedure. The lake is normally dry with inflow passing through the 12 inch conduit. The invert of the intake is at elevation 1820. Flow in excess of the conduit capacity would be stored until reaching the spillway crest, elevation 1830.0. Inflows would then be discharged through the emergency spillway.

4.2 Maintenance of Dam. The condition of the dam and its appurtenances as observed by the inspection team was fair. The closure facility for the 12 inch conduit has been damaged and does not operate as designed. In addition, the spillway walls and crest have undergone deterioration and cracks have developed. No formal maintenance manual exists.

4.3 Maintenance of Operating Facilities. Operation of the outlet works slidegate closure is restricted due to the bent operating rod.

4.4 Warning System. No formal warning system exists.

4.5 Evaluation. Maintenance of the facility appears to be insufficient. Spalled and cracked areas of the spillway crest and walls should be repaired. The operating mechanism for the outlet works should be repaired to operate as designed before a full reservoir is maintained. In addition, a formal warning system for the protection of downstream inhabitants should be developed. Included in the plan should be provision for around-the-clock surveillance of the facility during periods of unusually heavy precipitation.

SECTION 5

HYDRAULICS AND HYDROLOGY

5.1 Design Data. No design reports, calculations or miscellaneous design data are known to exist for the facility; however, a few drawings of the facility were in PennDER files. In a report upon the application of the dam, a spillway value of 1225 cfs was computed as a minimum value acceptable. As noted in Appendix D, the spillway capacity exceeds this minimum value.

5.2 Experience Data. Records of reservoir levels and/or spillway discharges are not available. The dam was completed in 1974 and no major flooding at the facility has been experienced. No records of performance are available.

5.3 Visual Observations. On the date of the inspection, no conditions were observed that would prevent the facility from operating as designed during a flood event. The significant spalling and cracking of the concrete spillway and walls should be repaired. See Appendix C for photographs of the outlet works closure mechanism and the spillway area.

5.4 Method of Analysis. The facility has been analyzed in accordance with procedures and guidelines established by the U.S. Army Corps of Engineers, Baltimore District, for Phase I hydrologic and hydraulic evaluations.

5.5 Summary of Analysis.

a. Spillway Design Flood (SDF). In accordance with the procedures and guidelines contained in the National Guidelines for Safety Inspection of Dams for Phase I Investigations, the SDF for Ross Dam ranges between the 100 year flood and $1/2$ Probable Maximum Flood (PMF). This classification is based on the relative size of the dam (small) and the potential hazard of failure to downstream development (significant). Due to the small storage (less than 100 ac-ft) and small height (approximately 21 feet), the SDF selected is the 100 year flood.

b. Results of the Analysis. The 100 year flood peak is derived by averaging the peak flow value obtained from two regression equations. The first regression equation is from Bulletin 13, Floods in Pennsylvania Water Resources Bulletin. Guidelines are provided to determine the peak value by use of regional statistical data. The second regression equation is from the Hydrologic Study, Tropical Storm Agnes, North Atlantic Division, U.S. Army Corps of Engineers, 1975. Guidelines are provided to determine the flood peak by use of map coefficients and logarithmic equations. The following results are obtained.

| <u>100 year flood peak</u> | <u>CFS</u> |
|--|------------|
| Bulletin 13 | 500 |
| North Atlantic Division- Tropical Storm Agnes | 1000 |
| Average 100 year flood peak | 750 |

To determine the adequacy of the spillway, the average value for the 100 year flood is compared against the maximum outflow at low point top of dam. If the maximum outflow exceeds the 100 year average peak value derived above, then the spillway is rated adequate. If, however, the 100 year average peak value exceeds the maximum outflow at top of dam, the spillway is rated inadequate. Results are as follows:

| | <u>CFS</u> |
|---------------------------------|------------|
| Maximum Outflow at top of dam - | 2000 |
| Average 100 year flow peak | 750 |

5.6 Spillway Adequacy. Under existing conditions, Ross Dam can pass the 100 year flood peak value. Since this structure can pass the selected SDF (100 year flood), the spillway is rated adequate.

SECTION 6
STRUCTURAL STABILITY

6.1 Evaluation of Structural Stability.

a. Visual Observations.

(1) Embankment. Visual observations of Ross Dam indicate that the dam is in fair condition. The embankment is constructed of onsite glacial material consisting of silty, clayey, gravelly sand. The dam is approximately 20.7 feet high, has a crest width of 16.5 feet, a downstream slope of 2H:1V and upstream slope of 2.5H:1V. Brush covers the upstream slope above the spillway elevation. Only a few pieces of riprap were found on the upstream slope. No seepage was observed since a reservoir was not being retained. The embankment adjacent to the left spillway wall is low. This is probably due to settlement; PennDER noted in 1974 that this area appeared poorly compacted. Erosion was not found to be a problem, but continued settlement could concentrate runoff and cause erosion.

(2) Appurtenant Structures

The spillway is a 35 foot long concrete structure that has an ogee weir and a stilling basin. Ten 4-inch pipes are set into the spillway weir for securing a fish screen. Spillway flow could be restricted by floating debris. The concrete spillway walls are broken and spalled. This appears to be a problem caused by poor quality concrete.

The outlet works consists of a 12 inch CMP concrete encased. It has a slide gate closure operated by a hand wheel from the crest. Over the slide gate is a trash rack. With the exception of the bent operator rod, the outlet appears to be in good condition.

b. Design and Construction Data.

(1) Embankment. Design drawings and specifications were produced by Mr. L. F. Burlein, a civil engineer. The dam was designed to have a trapezoidal cutoff trench 8 feet wide at the bottom and 4 feet deep. The cutoff trench was to be filled and the embankment constructed of homogeneous impervious material. A gravel filled toe drain with a 6 inch diameter perforated CMP shown on Plate E-IV could not be located during the inspection. The embankment was designed to have a 14 foot wide crest, a downstream slope of 2.5H:1V, upstream slope of 3H:1V and a height of 17 feet.

(2) Appurtenant Structures. Drawings and specifications are as stated in 6.1b(1). No notable differences were observed during the inspection from the design, except the change in size of the outlet conduit and gate.

c. Operating Records. None.

d. Post Construction Changes. No formal construction changes are recorded. The embankment dimensions vary from design dimensions in crest width, slopes, and height. Severci noted differences from the design drawings were observed. There is essentially no riprap on the upstream embankment slope, and the spillway channel is not riprapped. The toe drain from the left abutment to the outlet works outlet was apparently changed or deleted. The embankment is about 4 feet higher than designed.

e. Seismic Stability. The dam is located in Seismic Zone 1. On the basis of visual observations, it is statically stable. Therefore, the seismic stability is considered adequate.

SECTION 7
ASSESSMENT AND RECOMMENDATIONS

7.1 Dam Assessment

a. Safety. The visual inspection and review of available design and construction data indicate that Ross Dam is in fair condition. The deteriorated condition of the spillway walls and the adjacent low areas of the embankment are the primary deficiencies which cause concern for the safety of this facility. In accordance with the recommended guidelines, the spillway design flood (SDF) for this facility is in the range of the 100-year flood to the 1/2 PMF. Based on the size of the dam and the degree of downstream hazard, the selected SDF is the 100-year flood.

The hydrologic and hydraulic computations indicate that the combination of reservoir storage and spillway discharge capacity will pass the SDF (100 year flood) prior to overtopping the embankment. Therefore, in accordance with the criteria outlined and evaluated in Section 5.5, the spillway for Ross Dam is considered to be adequate.

b. Adequacy of Information. The design and construction data contained in PennDER files, in conjunction with data collected during the recent visual inspection, are considered to be adequate for making a reasonable assessment of this dam.

c. Urgency. The recommendations presented below should be implemented without delay.

d. Necessity for Additional Studies. The results of this inspection indicate no need for additional studies at the present time.

7.2 Recommendations.

a. Necessary remedial measures should be implemented under the guidance of a qualified engineer to repair the deteriorated spillway walls and fill in the adjacent low areas of the embankment.

b. The control rod for the outlet works slide gate control should be repaired prior to maintaining a permanent pool.

c. Remove brush from the embankment.

d. The pipes on the spillway crest should be removed.

e. A formal surveillance and downstream emergency warning system should be developed for use during periods of heavy or prolonged precipitation.

f. An operation and maintenance manual or plan should be prepared for use as a guide in the operation and maintenance of the dam during normal and emergency conditions.

g. A schedule of regular inspection by a qualified engineer should be developed.

APPENDIX A

CHECKLIST - VISUAL INSPECTION

Check List
Visual Inspection
Phase 1

| Name | Dam | Ross | Dam | DER ID No. | 58-134 | County | <u>Susquehanna</u> | State | <u>Pennsylvania</u> |
|---------|------------|------|-----|------------|--------|---------|--------------------|-------------|---------------------|
| Date(s) | Inspection | 25 | Mar | 81 | | Weather | Ptly Cloudy | Temperature | 40's |

Pool Elevation at Time of Inspection 1820.0 M.S.L. Tailwater at Time of Inspection 1816.2 M.S.L.

Inspection Personnel:

J. Bianco, C.O.E. E. Hecker, C.O.E.
B. Cortright, C.O.E. J. Chernesky, PennDER
J. Evans, C.O.E.

B. Cortright Recorder

EMBANKMENT

| VISUAL EXAMINATION OF | | OBSERVATIONS |
|---|---|--------------------------|
| Any Noticeable Seepage | | None; no water impounded |
| Junction of Embankment with: | | |
| Abutments | Abutments - Low at left side; no cracking or sloughing | |
| Spillway | Spillway - Low behind spillway walls | |
| Surface Cracks | None. | |
| Crest Alignment: | | |
| Vertical | Vertical - Crest about 4 feet above spillway walls except low at walls and left abutment. | |
| Horizontal | Horizontal - Good. | |
| Unusual Movement or Cracking at or Beyond the Toe | | None. |

| VISUAL EXAMINATION OF EMBANKMENT | | OBSERVATIONS |
|-------------------------------------|--|---|
| Sloughing or Erosion: | | |
| Embankment Crest/Slopes | | Minor erosion of embankment slope near spillway due |
| Abutment Slopes | | to lack of vegetation |
| Riprap | | None except for bedding and a few stones on u/s slope. |
| Miscellaneous | | Small trees and brush on upstream slope Brush on downstream slope. |
| Instrumentation | | None. |
| Staff Gage and Recorder | | None. |

| OUTLET WORKS | |
|-----------------------|---|
| VISUAL EXAMINATION OF | OBSERVATIONS |
| Conduit | 12" Corrug. metal; fair condition |
| Intake Structure | Conc. slab with trashrack; good condition. |
| Emergency Gate | Slide gate on surface of intake structure. Control rod bent; gate inoperable. |
| Outlet Structure | Concrete headwall; fair condition. |
| Outlet Channel | Original streambed; earth & rock with trees and brush on sides. |

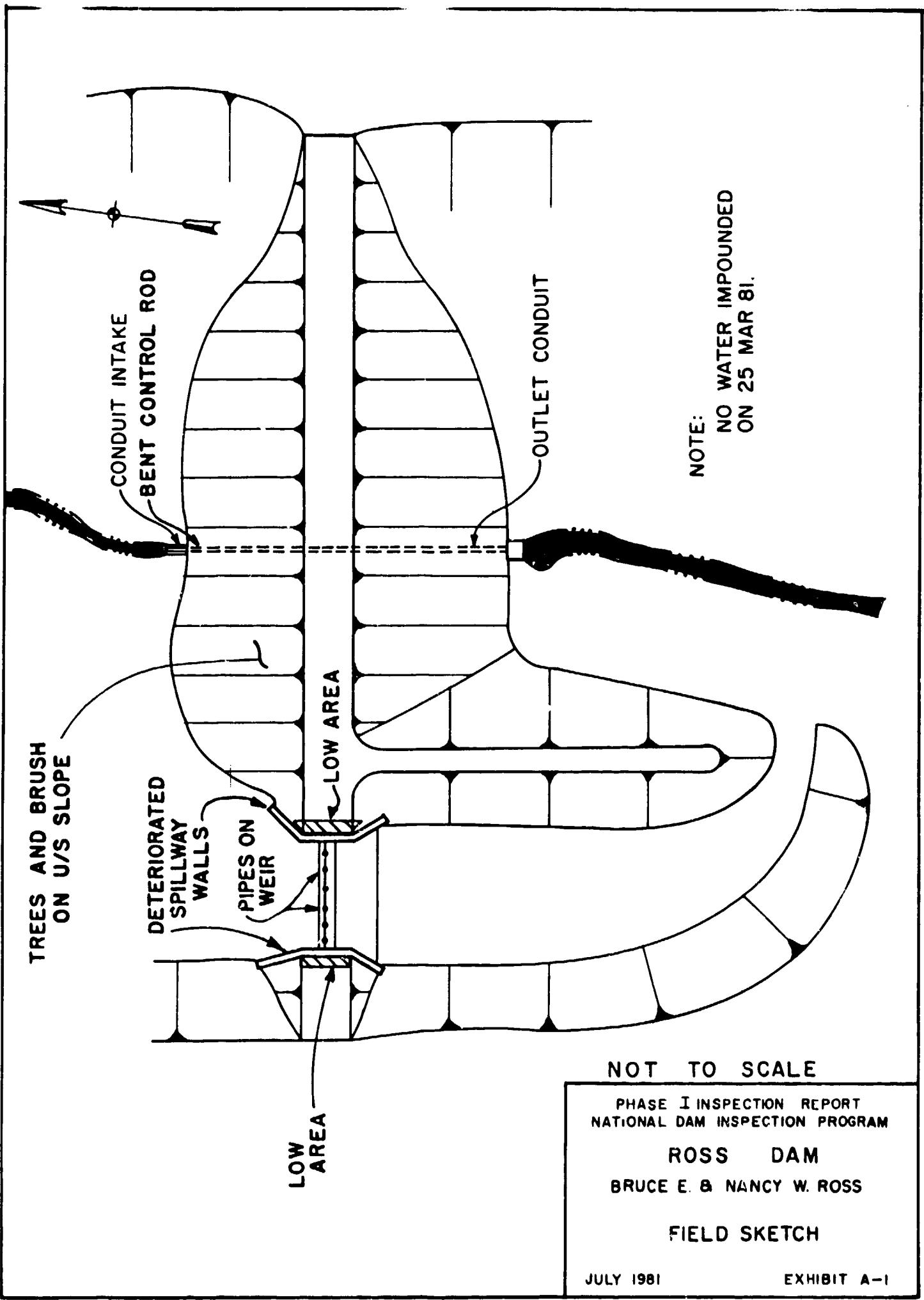
SPILLWAY

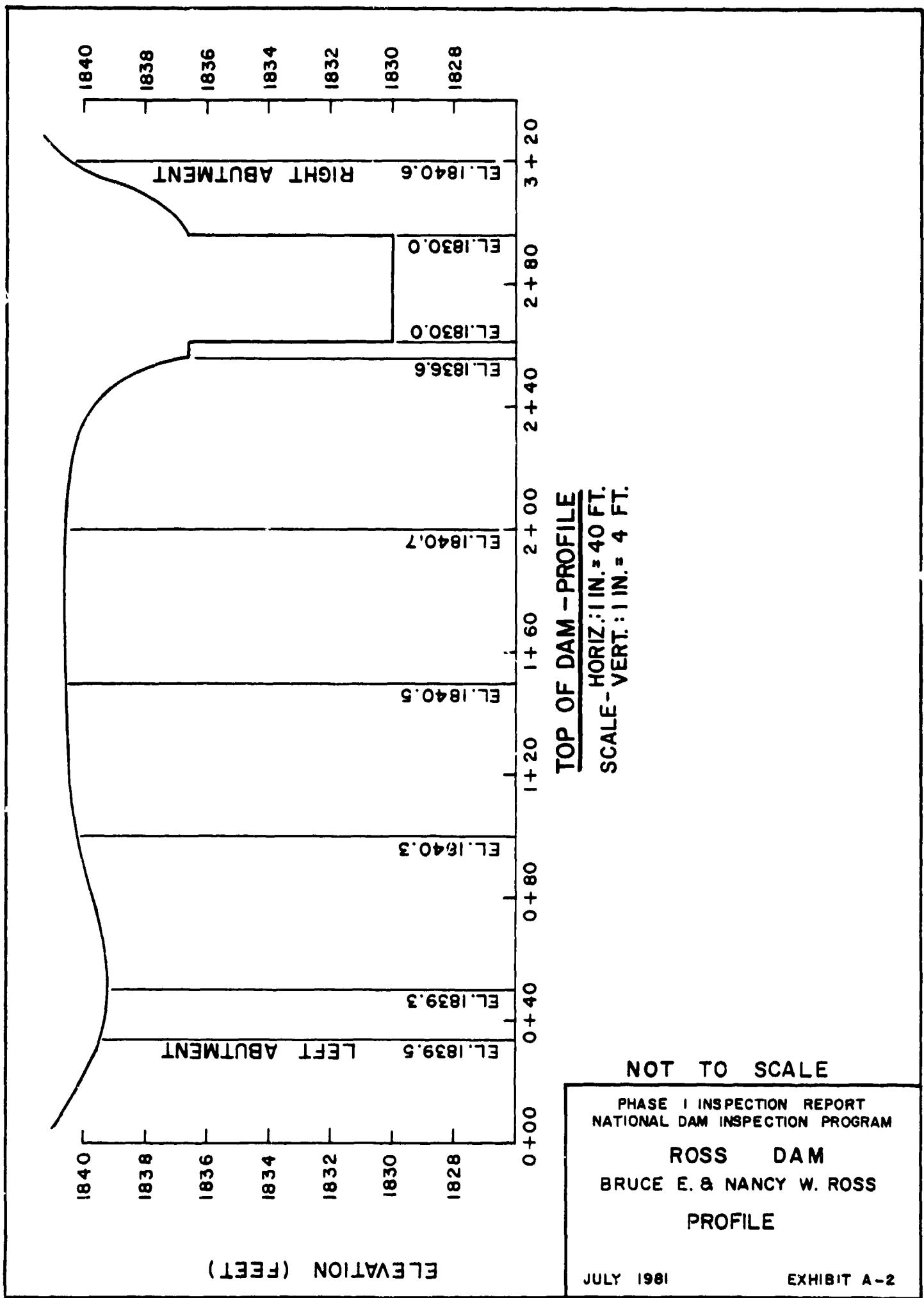
| VISUAL EXAMINATION OF | |
|----------------------------|--|
| | OBSERVATIONS |
| Concrete Weir and Walls | Ogee crest; good condition. Ten pipes (4" diam.) across crest. Walls cracked & spalled; poor quality concrete. |
| Approach Channel | Reservoir; unobstructed. |
| Discharge Channel | Cut in earth; dike on left side. Some erosion of bottom and sides. |
| Bridge and Piers | None. |

| VISUAL EXAMINATION OF RESERVOIR | |
|------------------------------------|--|
| | OBSERVATIONS |
| Slopes | Flat; appear stable. Minor sloughing along left bank near dam. Apparently due to frost action. |
| Sedimentation | None; no water impounded except when capacity of outlet conduit exceeded. |

DOWNSTREAM CHANNEL

| VISUAL EXAMINATION OF | OBSERVATIONS |
|-----------------------------------|--|
| Condition (Obstructions, etc.) | Brush adjacent to streambed. Crosses LR 57044 & Township Route T-470 approx. 1.4 miles downstream of dam. |
| Slopes | Moderate slopes initially; then mild |
| Approximate Number of Homes | One house 1.4 miles d/s. First floor 15 feet above streambed. Two houses 4 mi. d/s w/ff 6 ft. above streambed. |





APPENDIX B

CHECKLIST - ENGINEERING DATA

NAME OF DAM - Ross Dam
Design, Construction, Operation
Phase I
ID # 70-58-134

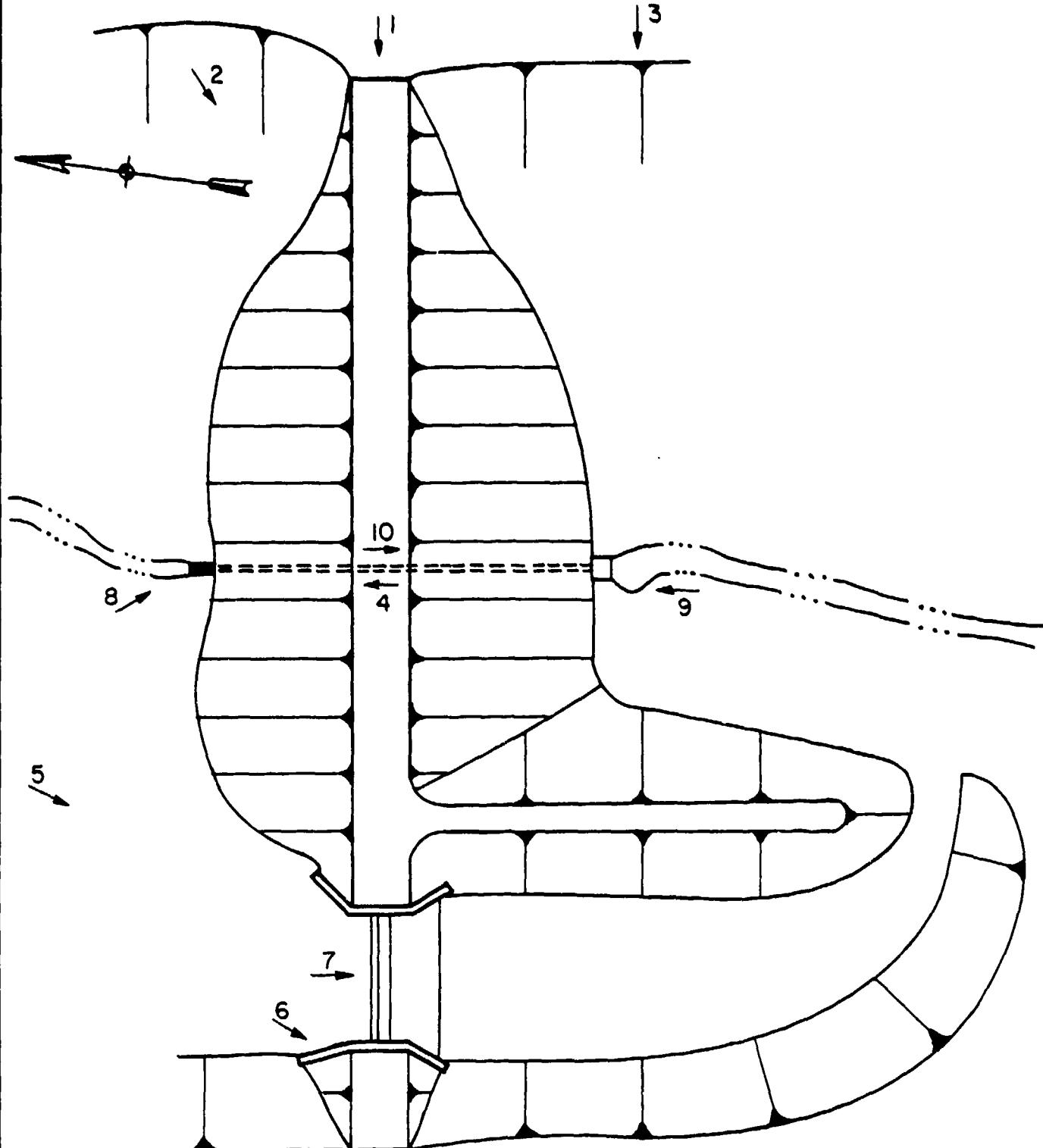
| ITEM | REMARKS |
|---|---|
| As-built Drawings | Cross-Section and Profile of Dam. Reservoir area, spillway section data. See Appendix E of this report. |
| Regional Vicinity Map | U.S.G.S. Clifford, PA., quadrangle sheet, 7-1/2 minute quad sheet, see Appendix E, Plate E-II. |
| Construction History | Dam was designed by Mr. L. P. Burlein, and was completed in November 1974. |
| Typical Sections of Dam | See Appendix E, for cross sections. |
| Outlets - Plan Details Constraints Discharge Ratings | Outlet plans are shown in Appendix E. The 12 inch CMP has been built with an inclined gate control valve, having a positive upstream closure. |
| Rainfall/Reservoir Records | None. |

| ITEM | REMARKS |
|---|--|
| Design Reports | Hydrologic data from U.S. Department of Agriculture (SCS) was found in the PennDER files. |
| Geology Reports | Soil Analysis performed by the engineer on the design of the facility. This can be found in the PennDER files. |
| Design Computations Hydrology and Hydraulics Dam Stability Seepage Studies | Hydrologic data from U.S. Department of Agriculture (SCS) No other data. |
| Materials Investigations Boring Records Laboratory Field | Borings are described in detail in report entitled Specifications for Construction of Earthen Dam and Concrete Spillway Test Holes are Indicated on Design Drawings, (See Plate E-VI) |
| Post-Construction Surveys of Dam | None. |
| Borrow Sources | At site location. |

| ITEM | REMARKS |
|---|----------------|
| Monitoring Systems | None. |
| Modifications | None. |
| High Pool Records | None. |
| Post-Construction Engineering Studies and Reports | None reported. |
| Prior Accidents or Failure of Dam Description Reports | N/A. |
| Maintenance Operation Records | None. |

| ITEM | REMARKS |
|--|--|
| Spillway Plan Sections Details | Spillway section and details are shown in Appendix E of this report. This information is from PennDER files. |
| Operating Equipment Plans & Details | N/A. |
| Specifications | None. |
| Miscellaneous | PennDER Inspection Reports, photographs of embankment during construction. |

APPENDIX C
PHOTOGRAPHS



NOT TO SCALE

PHASE I INSPECTION REPORT
NATIONAL DAM INSPECTION PROGRAM

ROSS DAM

BRUCE E. & NANCY W. ROSS

PHOTOGRAPH LOCATION

PLAN

JULY 1981

EXHIBIT C-1

3 PHOTOGRAPH IDENTIFICATION NUMBER

→ LOCATION AND ORIENTATION OF CAMERA

ROSS DAM



1. Upstream face, right abutment.



2. Upstream face. Lower limit of brush
is at same elevation as spillway crest.

ROSS DAM



3. Downstream view of the hillside at the side of the highway, 8.05 miles from the dam.



4. Reservoir area.

ROSS DAM



5. Spillway Approach.

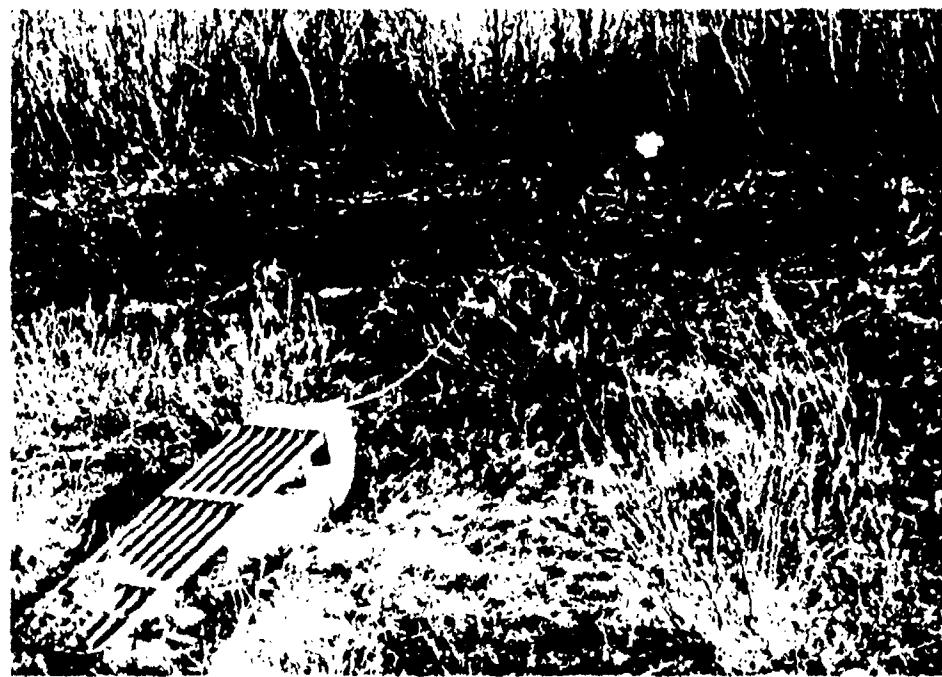


6. Levee-spillway wall.

ROSS DAM

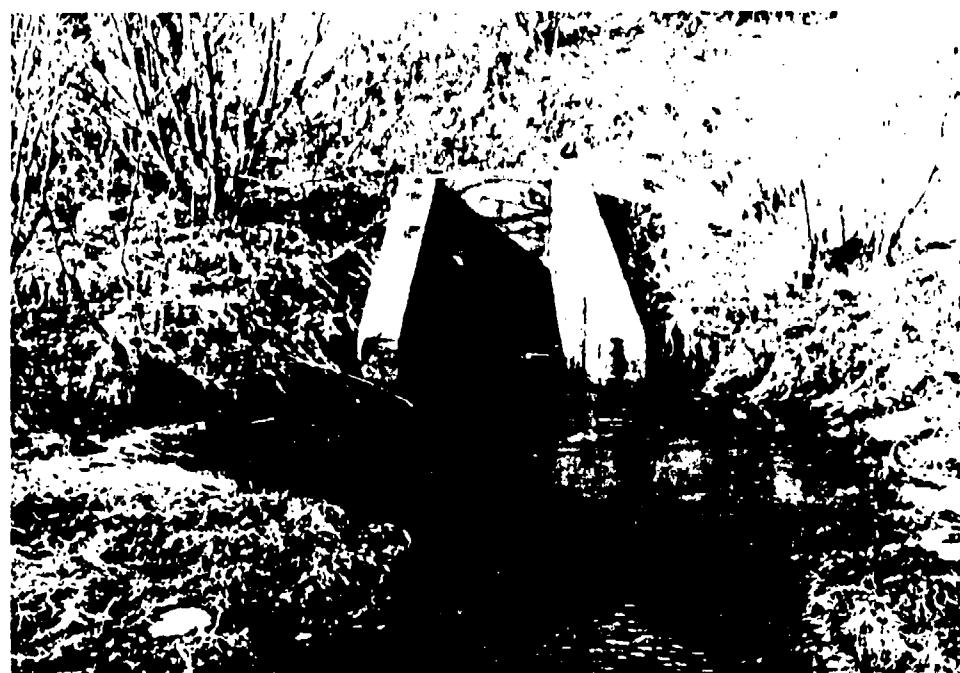


7. Spillway of large channel. Barn on left and weir in foreground.



8. Outlet works intake structure. Note bent intake rod.

ROSS DAM



9. Headwall on downstream end of outlet works conduit.



10. Downstream bank immediately beyond toe of dam.

ROSS DAM



Fig. 1. First downstream residence.

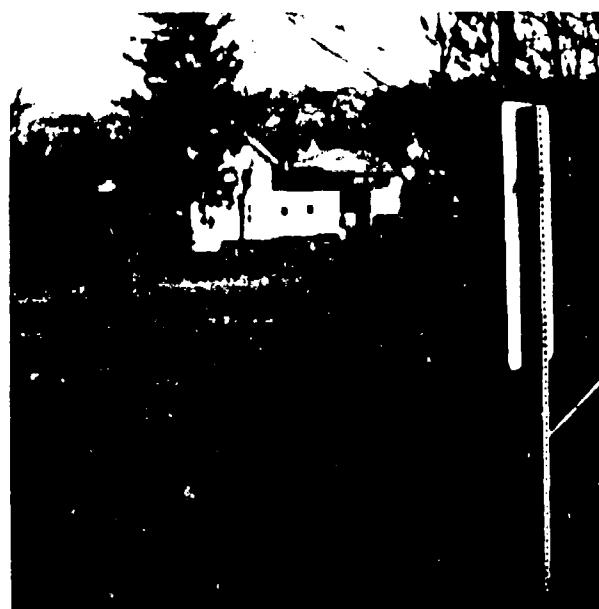


Fig. 2. Second downstream residence.

APPENDIX D
HYDROLOGY AND HYDRAULICS

SUBJECT DAM SAFETY ANALYSISCOMPUTATIONS ROSS DAMSHEET 1 OF 1 SHEETSCOMPUTED BY JPBCHECKED BY _____ DATE 4-14-81DAM CLASSIFICATION:

| | | |
|--------------|---|---------------------------|
| SIZE OF DAM | - | SMALL |
| HAZARD | - | SIGNIFICANT |
| REQUIRED SDF | - | 100 YEAR FLOOD TO 1/2 AMF |

DAM STATISTICS:

| | | |
|-----------------------------|---|----------------------|
| HEIGHT OF DAM | - | 20.7 FEET |
| STORAGE AT NORMAL POOL | - | 0 AC-FT |
| STORAGE AT TOP OF DAM | - | 70 AC-FT |
| DRAINAGE AREA ABOVE DAMSITE | - | 0.85 mi ² |

ELEVATIONS: (M.S.L.)

| | | |
|------------------------------|---|--------|
| TOP OF DAM LOW POINT (FIELD) | - | 1836.6 |
| NORMAL POOL | - | 1820.0 |
| STREAMBED AT TOE OF DAM | - | 1815.9 |
| SPILLWAY CREST | - | 1830.0 |
| OUTLET WORKS | | |
| INTAKE INVERT | - | 1820.0 |
| OUTLET INVERT | - | 1815.9 |

HYDROGRAPH PARAMETERS:

| | | |
|---------------------|---|-------------------------|
| RIVER BASIN | - | SUSQUEHANNA RIVER BASIN |
| ZONE | - | 11 |
| SNYDER COEFFICIENTS | | |

C_P - 0.62C_E - 1.50MEASURED PARAMETERS:*

L = LENGTH OF LONGEST WATERCOURSE

L = 7000 FT = 1.33 mi

L_{CA} = LENGTH OF LONGEST WATERCOURSE TO
CENTROID OF THE BASINL_{CA} = 3800 FT
0.72 mi

* FROM U.S.G.S. QUAD SHEET, CLIFFORD, PA.

7 1/2 MINUTE SERIES SCALE: 1:24000

SUBJECT DAM SAFETY ANALYSISCOMPUTATIONS ROSS DAMSHEET 2 OF 2 SHEETSCOMPUTED BY gPB

CHECKED BY _____

DATE 4-14-81

NOTE: ELEVATIONS ARE REFERENCED TO U.S.G.S. QUAD SHEET ENTITLED CLIFFORD, PA. ELEVATION 1820 WAS ASSUMED TO BE THE ELEVATION OF THE INVERT OF THE INTAKE.

t_p = SNADERS BASIN LAGTIME TO PEAK, IN HOURS

$$t_p = C_t (L L_c a)^{0.3}$$

$$= 1.50 (0.72(1.33))^{0.3} = 1.48 \text{ hours}$$

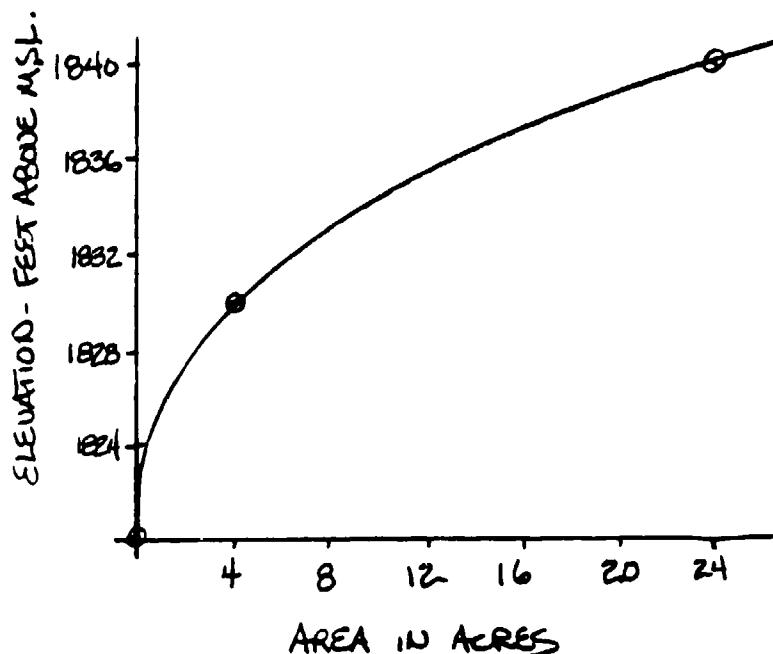
RESERVOIR CAPACITY:

- SURFACE AREA AT SPILLWAY CREST (1830.0) - 4
- SURFACE AREA AT ELEVATION 1840.0 - 24
(PLAINMETERED VALUE)

ASSUME CONICAL METHOD APPLIES TO FIND VOLUME IN POOL AT SPILLWAY CREST.

$$V = \frac{1}{3} A H = \frac{1}{3}(4)(10) = 13.33 \text{ AC-FT.}$$

\therefore STORAGE AT ELEVATION 1820.0 = 0 AC-FT.
STORAGE AT SPILLWAY CREST 1830.0 = 13 AC-FT.



FOR FLOOD ROUTING PURPOSES
ASSUME THE AVERAGE END AREA METHOD IS SUITABLE
TO ELEVATIONS ABOVE
NORMAL POOL - ELEVATION
1820, AND $\Delta V = \frac{(A_1 + A_2)}{2} \Delta H$

SUBJECT DAM SAFETY ANALYSISCOMPUTATIONS ROSS DAMSHEET 3 OF 3 SHEETSCOMPUTED BY JPB

CHECKED BY _____

DATE 4-14-81ELEVATION - STORAGE TABLE :

| ELEVATION (MSL) | AREA (AC) | ΔH (ft) | $\Delta V = \frac{(A_1 + A_2)}{2} \Delta H$ (AC-FT) | CUMULATIVE VOLUME (AC-FT) |
|--------------------|--------------|------------|--|---------------------------------|
| 1820.0 | 0 | - | - | 0 |
| 1830.0 | 4 | - | 13.3 | 13.3 |
| 1832.0 | 6.5 | 2.0 | 10.5 | 23.8 |
| 1834.0 | 9.5 | 2.0 | 16.0 | 39.8 |
| 1836.0 | 13.0 | 2.0 | 22.5 | 62.3 |
| 1836.6 (TOD)* | 15.0 | 0.6 | 8.4 | 70.7 |
| 1838.0 | 18.0 | 1.4 | 23.1 | 93.8 |
| 1840.0 | 24.0 | 2.0 | 42.0 | 135.8 |
| 1842.0 | 31.0 | 2.0 | 55.0 | 190.8 |

* TOD = TOP OF DAM

NOTE: DRAINAGE AREA ABOVE DAM = 0.85 mi²

| ELEVATION (MSL) | STORAGE (AC-FT) |
|--------------------|--------------------|
| 1820.0 | 0 |
| 1830.0 | 13 |
| 1832.0 | 24 |
| 1834.0 | 40 |
| 1836.0 | 60 |
| 1836.6 (TOD) | 70 |
| 1838.0 | 90 |
| 1840.0 | 140 |
| 1842.0 | 190 |

BALTIMORE DISTRICT, CORPS OF ENGINEERS

SUBJECT DAM SAFETY ANALYSIS

PAGE _____

COMPUTATIONS ROSS DAM

SHEET 4 OF 4 SHEETS

COMPUTED BY JMB

CHECKED BY _____

DATE 5-11-81

SAF: BASED ON THE SMALL HEIGHT OF DAM AND THE SMALL STORAGE, THE SAF SELECTED FOR THIS POND WAS THE 100 YEAR FLOOD. THIS IS IN ACCORDANCE WITH THE GUIDELINE PROVIDED.

∴ USE SAF = 100 YEAR FLOOD

AMP CALCULATIONS:

SINCE THE SAF SELECTED FOR THIS POND HAS BEEN THE 100 YEAR FLOOD, NO CALCULATIONS ARE NECESSARY TO COMPUTE THE PROBABLE MAXIMUM PRECIPITATION (AMP) OR PROBABLE MAXIMUM FLOOD (PMF).

SUBJECT DAM SAFETY ANALYSIS
 COMPUTATIONS ROSS DAM SHEET 5 OF 5 SHEETS
 COMPUTED BY JPB CHECKED BY _____ DATE 4-15-81

EMERGENCY SPILLWAY CAPACITY:

SPILLWAY IS LOCATED NEAR RIGHT ABUTMENT OF DAM.
 SEE FIELD SKETCH IN APPENDIX A, EXHIBIT 1.

SPILLWAY DATA:

TYPE - OGEE CREST WEIR
 LENGTH - 35 FEET, effective length is $35 - 10(4") = 31.7$ feet
 CREST ELEVATION - 1830.0 M.S.L.
 LOW POINT TOP OF DAM - 1836.6 M.S.L.
 SPILLWAY FREEBOARD - 6.6 FEET
 C VALUE: VARIES FOR SPILLWAY CREST
 2.85 FOR EMBANKMENT

ASSUME DESIGN HEIGHT ON WEIR IS $H_o = 6$ FEET,
 AND $P = 2$ FEET THEREFORE $\frac{P}{H_o} = 0.333$.

(THIS IS FROM DESIGN OF SMALL DAMS, PAGE 378.
 USE FIGURE 249 AND FIGURE 250 TO COMPUTE
 C AS IT VARIES WITH HEAD.)

WITH $\frac{P}{H_o} = 0.333$, $C_o = 3.70$ $\lambda = \underline{31.7}$ FEET (effective length)

SPILLWAY RATING TABLE:

| POOL ELEVATION (MSL) | H_e (ft) | H_o (ft) | $\frac{H_e}{H_o}$ (ratio) | $\frac{C}{C_o}$ (ratio) | C | $Q = C L H_e^{3/2}$ (cfs) | use |
|-------------------------|---------------|---------------|------------------------------|----------------------------|------|------------------------------|------|
| 1830.0 | 0 | 6 | ... | ... | ... | ... | 0 |
| 1831.0 | 1 | 6 | 0.167 | 0.84 | 3.11 | 98.6 | 100 |
| 1832.0 | 2 | 6 | 0.333 | 0.89 | 3.29 | 294.0 | 290 |
| 1833.0 | 3 | 6 | 0.500 | 0.92 | 3.40 | 560.0 | 560 |
| 1834.0 | 4 | 6 | 0.667 | 0.95 | 3.52 | 892.7 | 890 |
| 1835.0 | 5 | 6 | 0.833 | 0.97 | 3.59 | 1272.4 | 1270 |
| 1836.0 | 6 | 6 | 1.000 | 1.00 | 3.70 | 1723.8 | 1720 |
| 1836.6 (TOD) | 6.6 | 6 | 1.100 | 1.01 | 3.73 | 2004.9 | 2000 |
| 1840.0 | 10 | 6 | 1.667 | 1.07 | 3.96 | 3969.7 | 3970 |

SUBJECT DAM SAFETY ANALYSISCOMPUTATIONS ROSS DAMSHEET 6 OF 6 SHEETSCOMPUTED BY JMB

CHECKED BY _____

DATE 5-11-81100 YEAR FLOOD ANALYSIS:

THE SELECTED SDF FOR ROSS DAM HAS BEEN THE 100 YEAR FLOOD. THIS IS BASED ON THE SIZE OF THE DAM AND THE HAZARD CATASTROPHICITY OF THE DAM.

TO DEVELOP THE 100 YEAR FLOOD, TWO REGRESSION EQUATIONS WILL BE USED TO DETERMINE THE PEAK VALUE. THE AVERAGE OF THE TWO REGRESSION PEAKS WILL BE THE 100 YEAR FLOOD PEAK USED IN THIS ANALYSIS.

BULLETIN 13 FLOOD PEAK:

FROM PLATE 1 - ROSS DAM IS IN REGION 2.

∴ REGRESSION EQUATION IS

$$Q_T = CA^X$$

where:

Q_T = PEAK FLOW FOR RETURN PERIOD T , IN YEARS

C = REGRESSION CONSTANT

A = DRAINAGE AREA IN SQUARE MILES

X = REGRESSION COEFFICIENT

RECALL DRAINAGE AREA = 0.85 mi^2

FOR 100 YEAR ANALYSIS:

$$T=100$$

$$A = 0.85 \text{ mi}^2$$

$$C = 564$$

$$X = 0.744$$

$$\therefore Q_{100} = CA^X = 564(0.85)^{0.744} = 499.8$$

∴ $Q_{100} \approx 500 \text{ cfs}$ FROM BULLETIN 13

NOW, COMPUTE THE 100 YEAR FLOOD PEAK FROM HYDROLOGIC STUDY - TROPICAL STORM AGNES, NORTH ATLANTIC DIVISION, 1975.

SUBJECT DAM SAFETY ANALYSISCOMPUTATIONS ROSS DAMSHEET 7 OF 10 SHEETSCOMPUTED BY JPB

CHECKED BY _____

DATE 5-11-81

$$\log(q_m) = C_m + 0.75 \log(A)$$

where: C_m = a map coefficient for mean log of annual peaks
 q_m = geometric mean of annual flood peaks, in cfs
 A = drainage area in square miles

FROM FIGURE 21 $C_m = 2.15$

$$\therefore \log(q_m) = 2.15 + 0.75 \log(0.85) = \underline{2.0971}$$

now, compute the standard deviation

$$S = C_s - 0.05 \log(A)$$

where: S = standard deviation
 C_s = a map coefficient for standard deviation

FROM FIGURE 22 $C_s = 0.35$

$$S = 0.35 - 0.05 \log(0.85)$$

$$S = \underline{0.3535}$$

now compute the 100 year flood peak from the following

$$\log(q_{100}) = \log(q_m) + K(p,g)S$$

where:

$\log(q_{100})$ = log of the annual flood peaks
 for a given exceedence frequency

$\log(q_m)$ = mean logarithm of annual flood peaks

$K(p,g)$ = standard deviate for a given exceedence frequency (p) and skew coefficient (g)

S = standard deviation, logs of annual peaks

\therefore WE NEED TO HAVE SKEW COEFFICIENT, FROM FIGURE 23

$$g = 0.30$$

$$K(p,g) = \underline{2.55}$$

THIS IS AN INTERPOLATED
VALUE FROM EXHIBIT 39 -
STATISTICAL METHODS IN
HYDROLOGY, LEO R. BEARD,
JAN. 1962.

$$\log(Q_{100}) = \log(Q_m) + K(p,g)S$$

$$\therefore \log(Q_{100}) = 2.0971 + (2.55)(0.3535)$$

$$\log(Q_{100}) = 2.9985$$

$$Q_{100} = 996.6 \quad \sim 1000 \text{ cfs}$$

THEREFORE, $Q_{100} = 1000 \text{ cfs}$

FROM TROPICAL STORM ADOES REPORT,
NORTH ATLANTIC DIVISION

NOW, COMPUTE THE 100 YEAR FLOOD PEAK BY AVERAGING
THE TWO REGRESSION EQUATIONS.

$$\therefore Q_{100} = \frac{500 + 1000}{2} = 750 \text{ cfs}$$

SPILLWAY ADEQUACY:

THE SPILLWAY IS CONSIDERED ADEQUATE IF THE MAXIMUM
OUTFLOW THROUGH THE SPILLWAY AT LOW POINT TOP OF DAM IS
GREATER THAN THE Q_{100} PEAK CALCULATED ABOVE.

THEREFORE,

$$\begin{aligned} \text{MAXIMUM OUTFLOW AT TOP OF DAM} &= 2000 \text{ cfs} \\ \text{MAXIMUM INFLOW FOR 100 YEAR FLOOD} &= 750 \text{ cfs} \end{aligned}$$

SINCE, THE MAXIMUM OUTFLOW IS GREATER THAN THE
MAXIMUM INFLOW, THE SPILLWAY IS RATED ADEQUATE.

SUBJECT DAM SAFETY ANALYSISCOMPUTATIONS ROSS DAMSHEET 9 OF 9 SHEETSCOMPUTED BY JPB

CHECKED BY _____

DATE 5-28-81OUTLET WORKS:

THE OUTLET WORKS CONSIST OF A 12 INCH CMP
ENCASED IN CONCRETE. INVERT OF UPSTREAM IS
AT ELEVATION 1820.0 AND DOWNSTREAM INVERT AT
ELEVATION 1815.4.

FOR THIS ANALYSIS ASSUME OUTLET CONTROL DUE TO
EXIT CHANNEL FOR SPILLWAY IS 150 FEET DOWNSTREAM.
THE STRUCTURE WAS ASSUMED TO HAVE A HEAD WALL
THAT IS MITERED TO CONFORM TO SLOPE, THEREFORE $K_c = 0.7$.
ASSUME LENGTH IS APPROXIMATELY 100 FEET AND FROM
THE HYDRAULIC CHARTS FOR THE SELECTION OF HIGHWAY CULVERT,
U.S. DEPARTMENT OF COMMERCE, DEC 1965.

$$K_c = 0.7$$

$$L \approx 100 \text{ FEET}$$

$$D_A = 12 \text{ INCH}$$



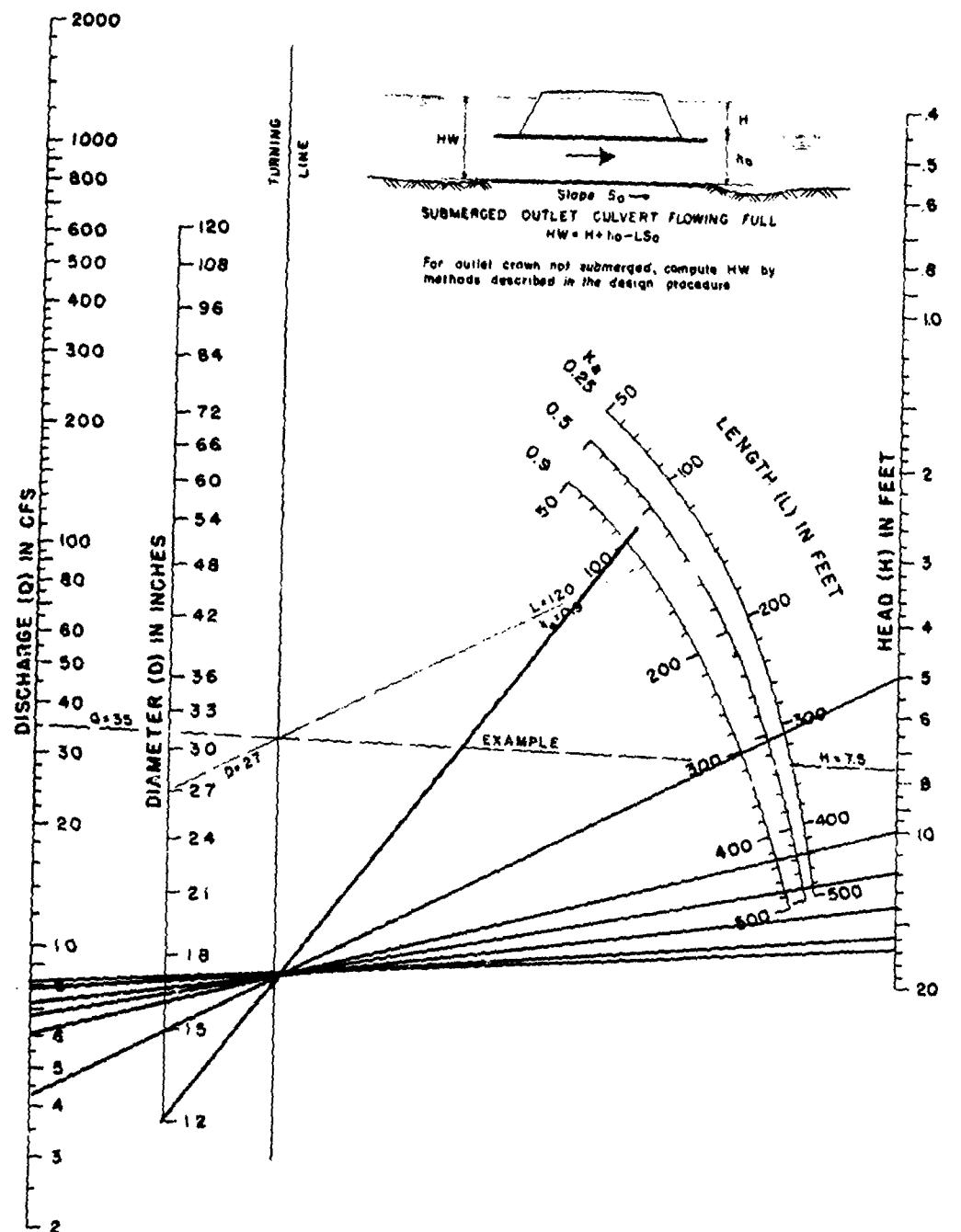
SUBMERGED OUTLET CULVERT FLOWING FULL

① ASSUME THAT OUTLET END OF PIPE IS SUBMERGED BY 3.1 FEET
TAILWATER IS AT ELEVATION - 1820.0

H = DIFFERENTIAL HEAD BETWEEN UPSTREAM POOL ELEVATION
AND DOWNSTREAM TAILWATER

| POOL ELEVATION (MSL) | TW (MSL) | H (FT) | Q (CFS) | REMARKS |
|-------------------------|-------------|-----------|------------|----------------|
| 1825.0 | 1820.0 | 5.0 | 4.3 | |
| 1830.0 | 1820.0 | 10.0 | 6.0 | SPILLWAY CREST |
| 1832.0 | 1820.0 | 12.0 | 7.0 | |
| 1834.0 | 1820.0 | 14.0 | 7.5 | |
| 1836.0 | 1820.0 | 16.0 | 7.9 | |
| 1836.6 | 1820.0 | 16.6 | 8.2 | MAXIMUM POOL |

CHART II



HEAD FOR
STANDARD
C. M. PIPE CULVERTS
FLOWING FULL
 $n = 0.024$

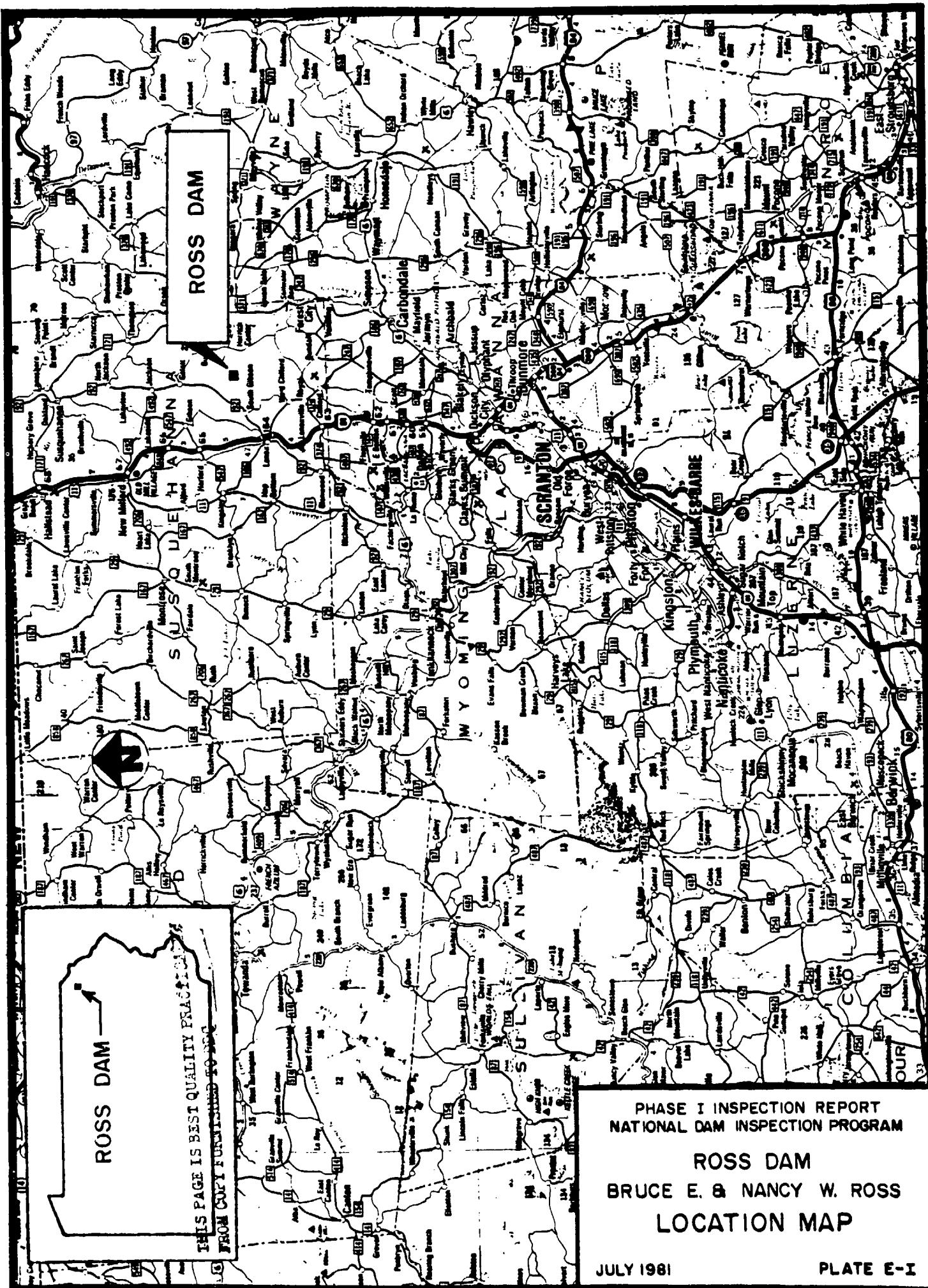
BUREAU OF PUBLIC ROADS JAN 1963

D-10

21 655 ✓

APPENDIX E

PLATES

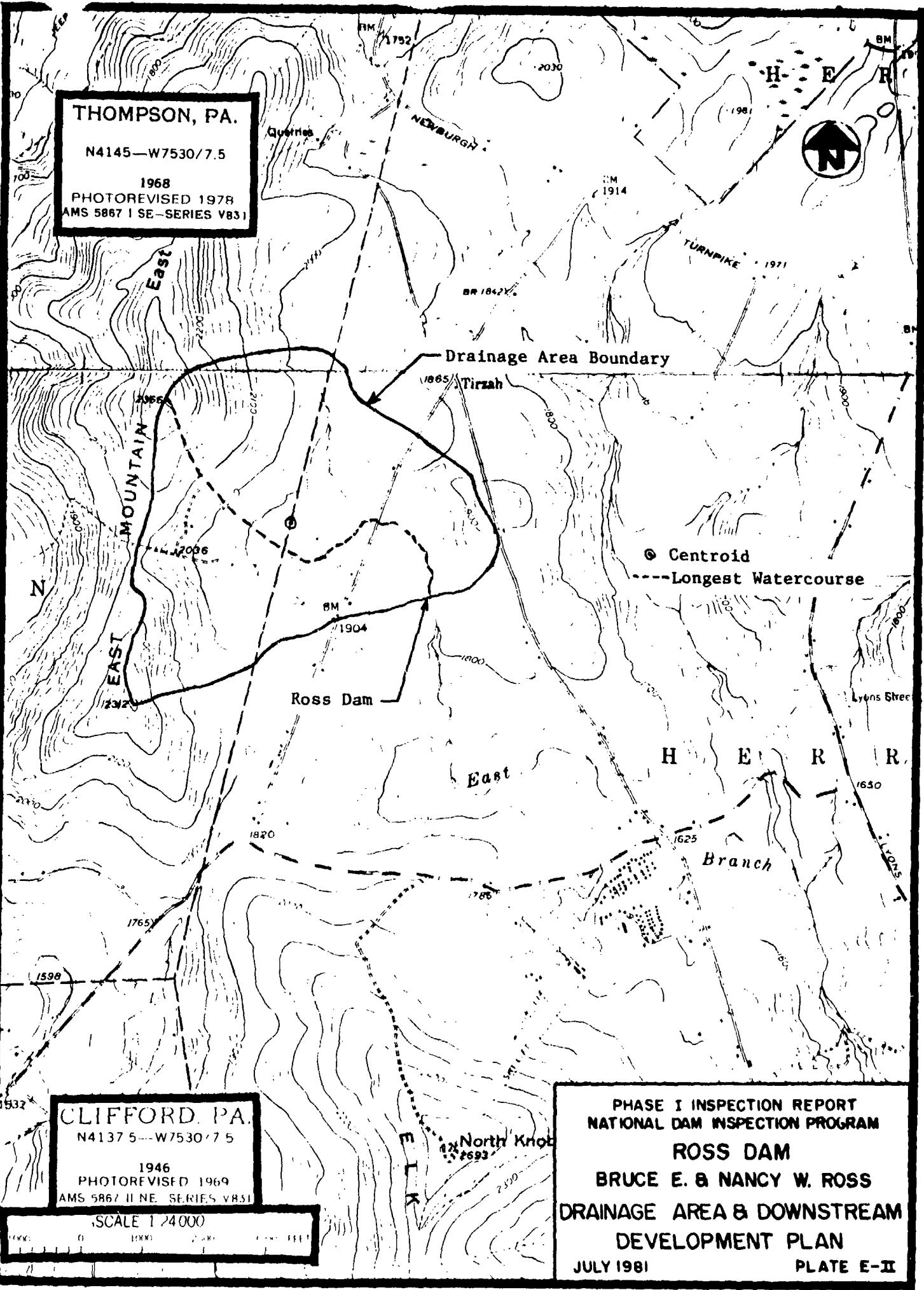


PHASE I INSPECTION REPORT
NATIONAL DAM INSPECTION PROGRAM

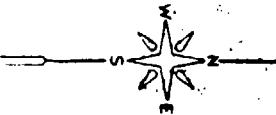
ROSS DAM
BRUCE E. & NANCY W. ROSS
LOCATION MAP

JULY 1981

PLATE E-I



TOTAL PROPERTY ACRESAGE 559.4



JUGQUEHANNA COUNTY

MAP
SHOWING LOCATION OF PROPOSED
DAM AND LAKE
HERICK TOWNSHIP

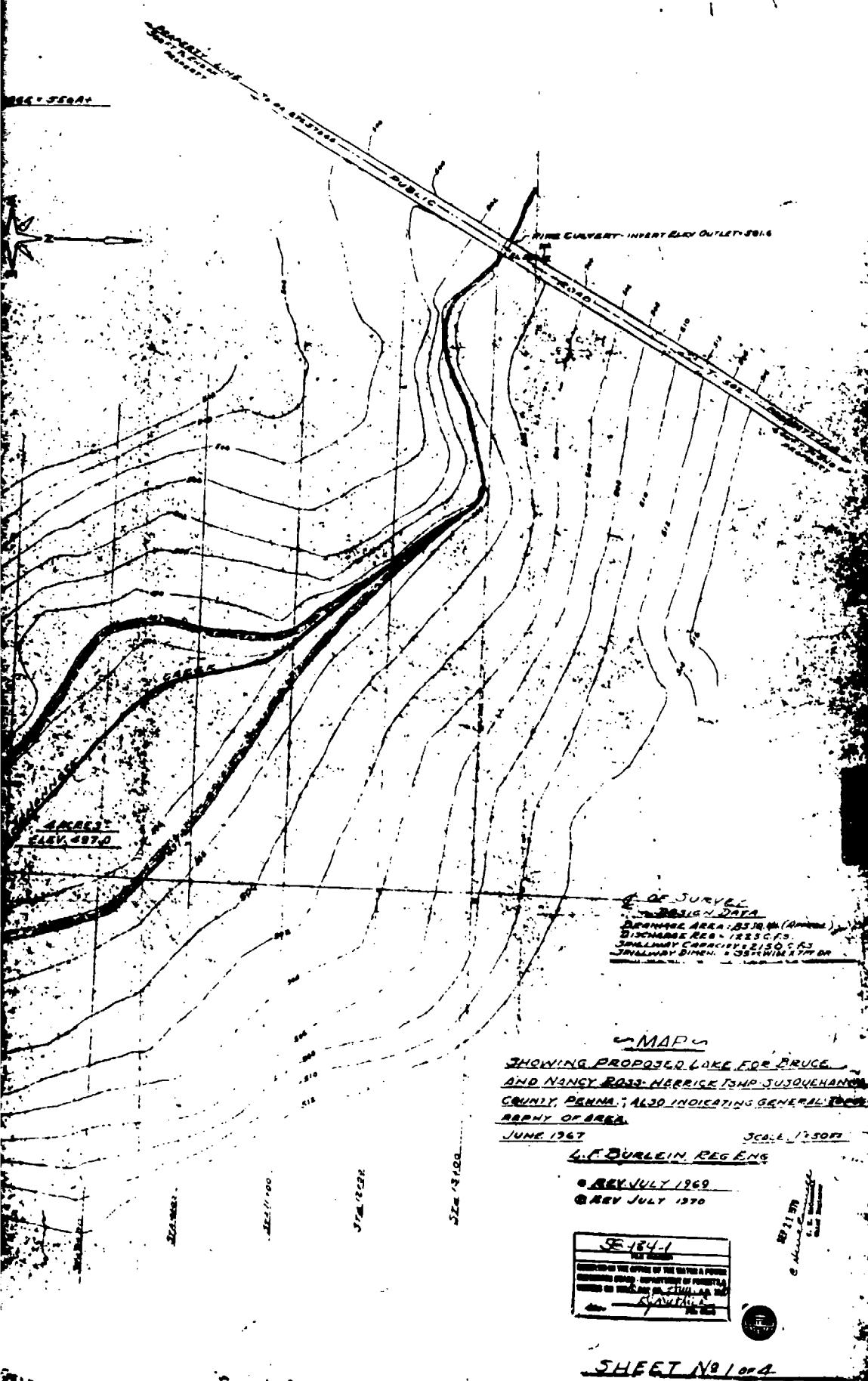
MAP SCALE

400 FT TO SOUTH
PROPERTY LINE

LAKE
LEVEL

ACRES
ELEV. 697.0

SCALE: 1/5000



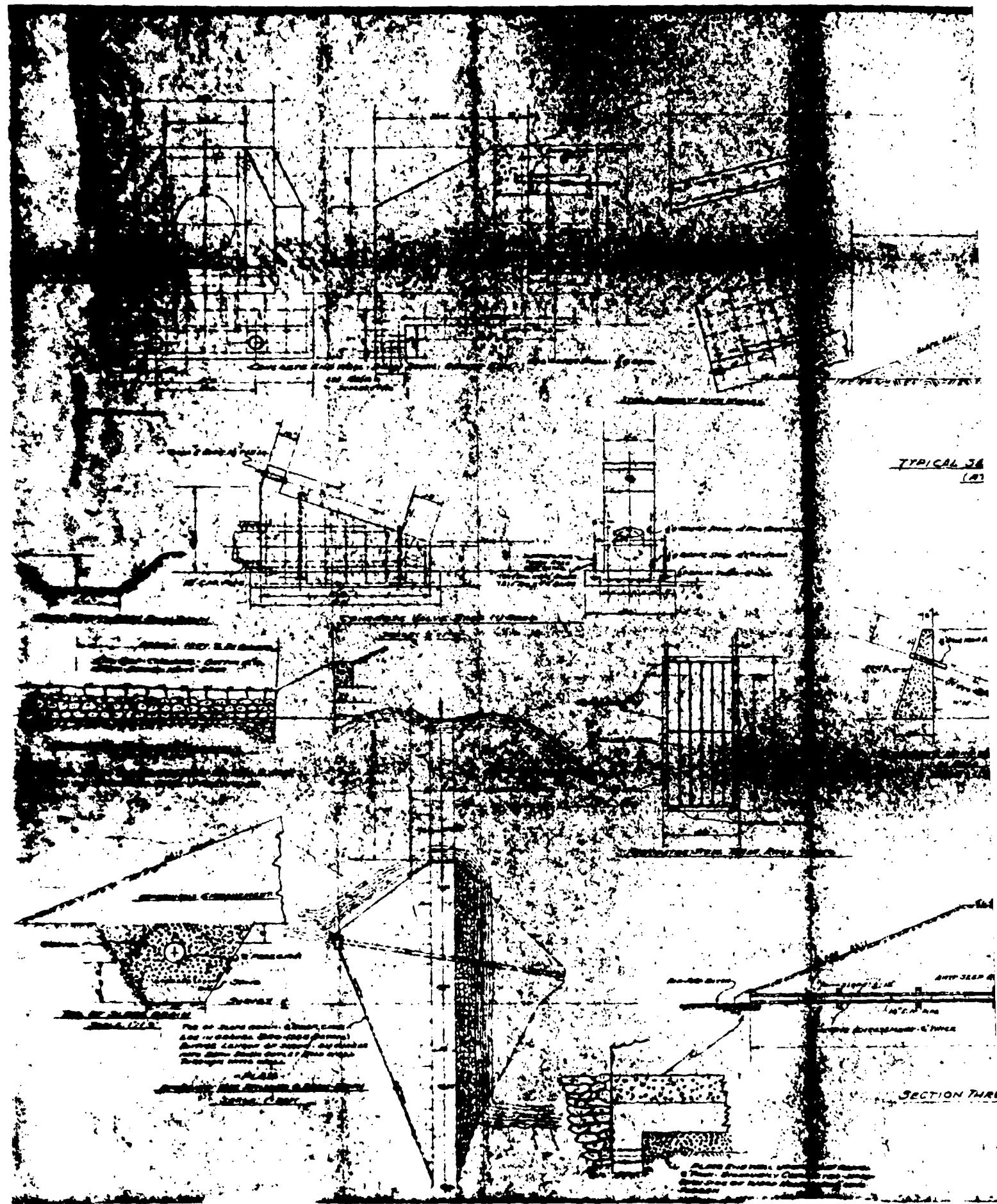
THIS PAGE IS BEST QUALITY PAGE
FROM COPY FURNISHED TO YOU

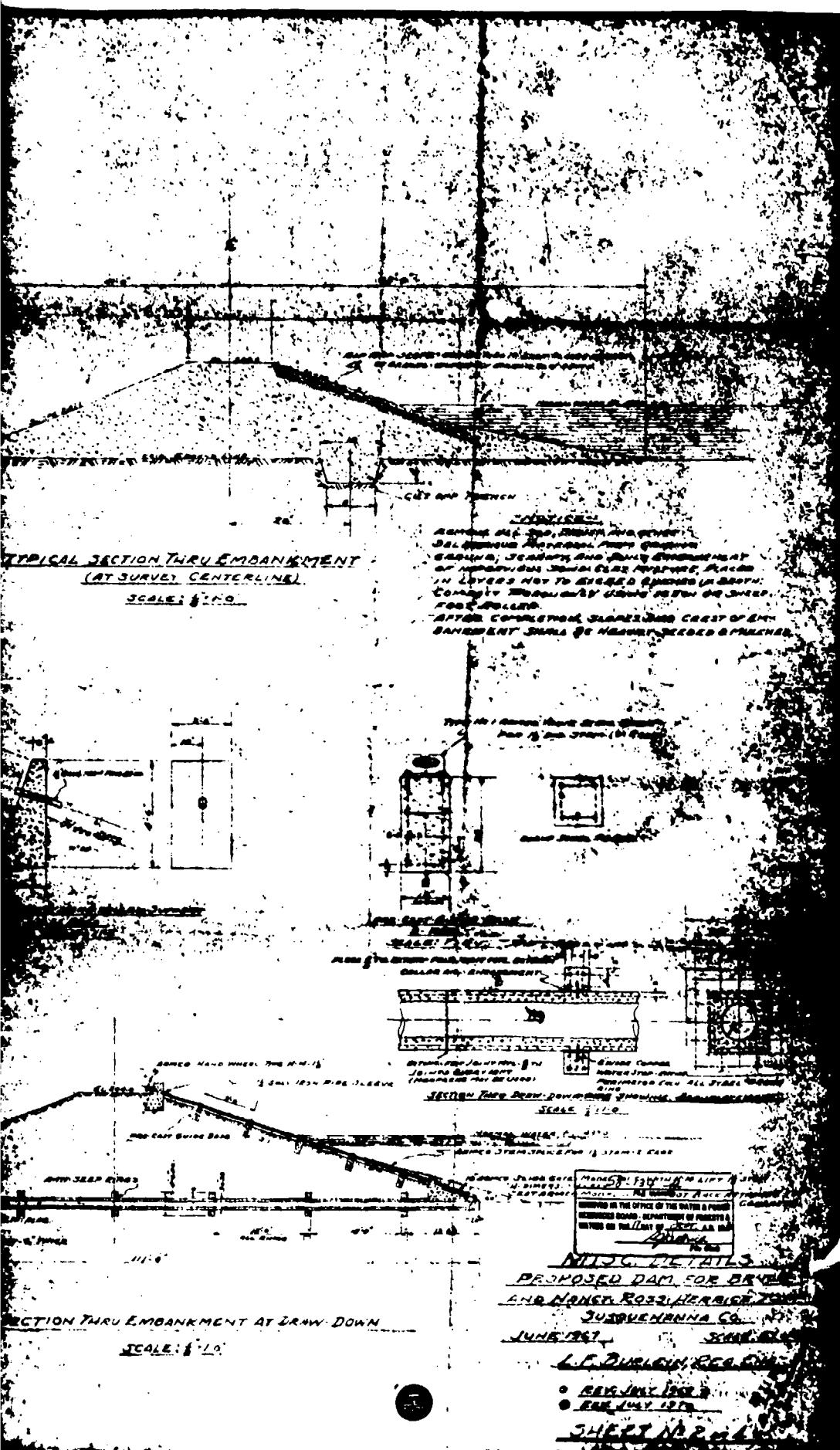
PHASE I INSPECTION REPORT
NATIONAL DAM INSPECTION PROGRAM

ROSS DAM
BRUCE E. & NANCY W. ROSS

JULY 1981

PLATE E-2





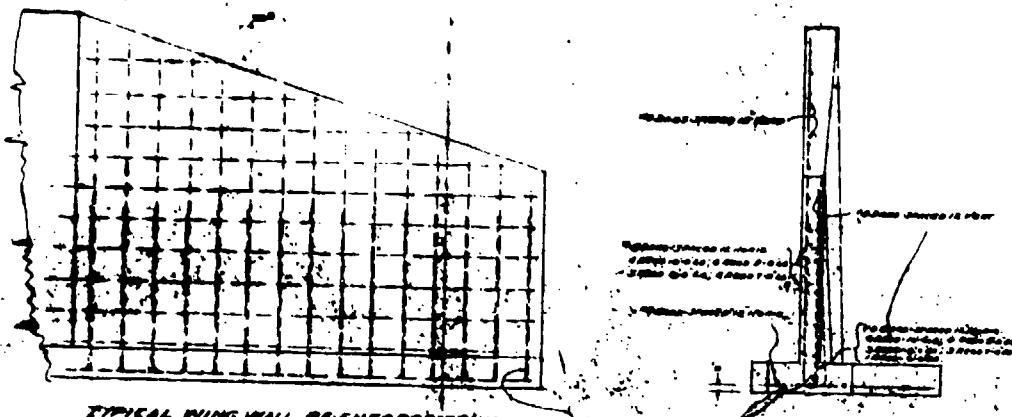
THIS PAGE IS BEST QUALITY PRACTICAL
COPY FURNISHED TO DDC

PHASE I INSPECTION REPORT
NATIONAL DAM INSPECTION PROGRAM

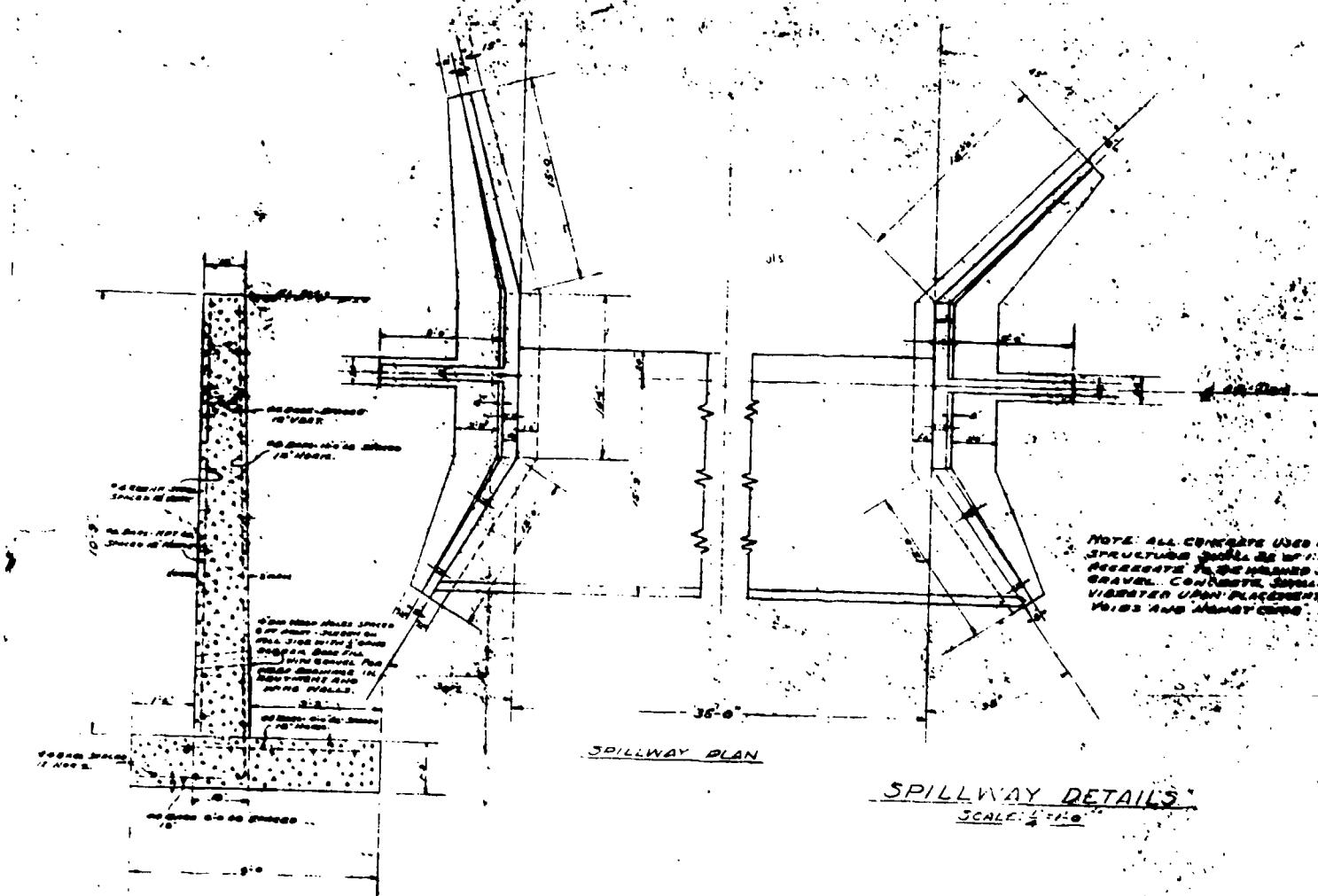
ROSS DAM
BRUCE E. & NANCY W. ROSS

JULY 1981

PLATE E-IV



TYPICAL SWING WALL RE-ENFORCEMENT
SCALE: 1"-0"



SECTION THRU ADJUSTMENT
SCALE: 1" = 10'

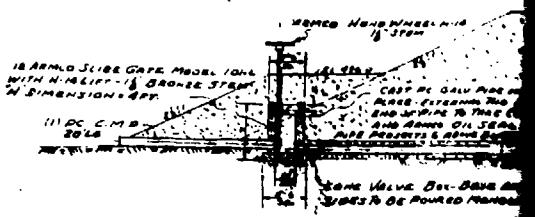
MISC DETAILS

DAM AND SPILLWAY FOR BRUCE AND NANCY
ROSS. HERRICK T3HP. SUSQUEHANNA CO.
JUNE 1967

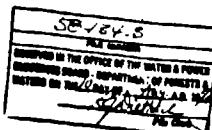
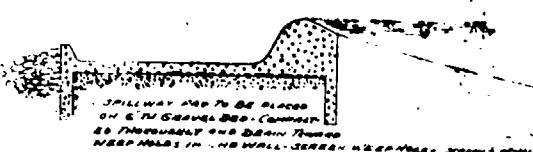
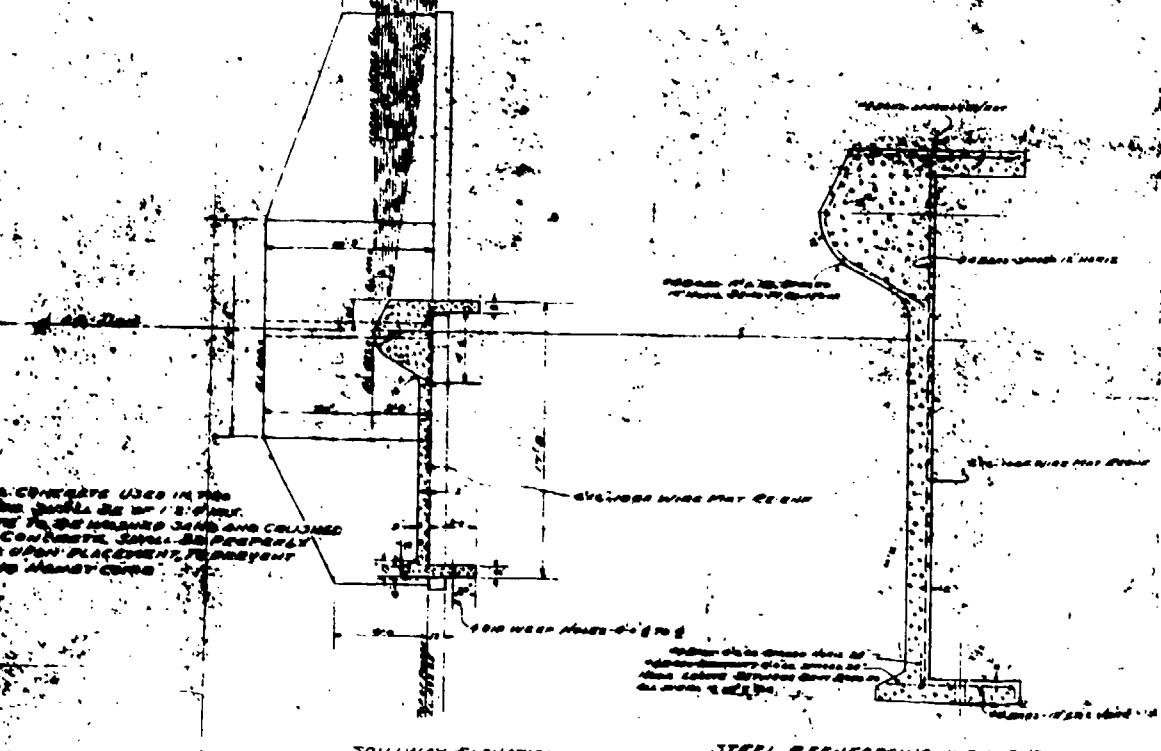
SCALE: AS SHOWN
L.F. BURLEIN, REG. LNC

• REV. JULY 1965

© RAY JULY 1970



ALTERN



ALTERNATE DESIGN OF DRAWDOWN ON OUTLET END
(NOT TO BE USED)

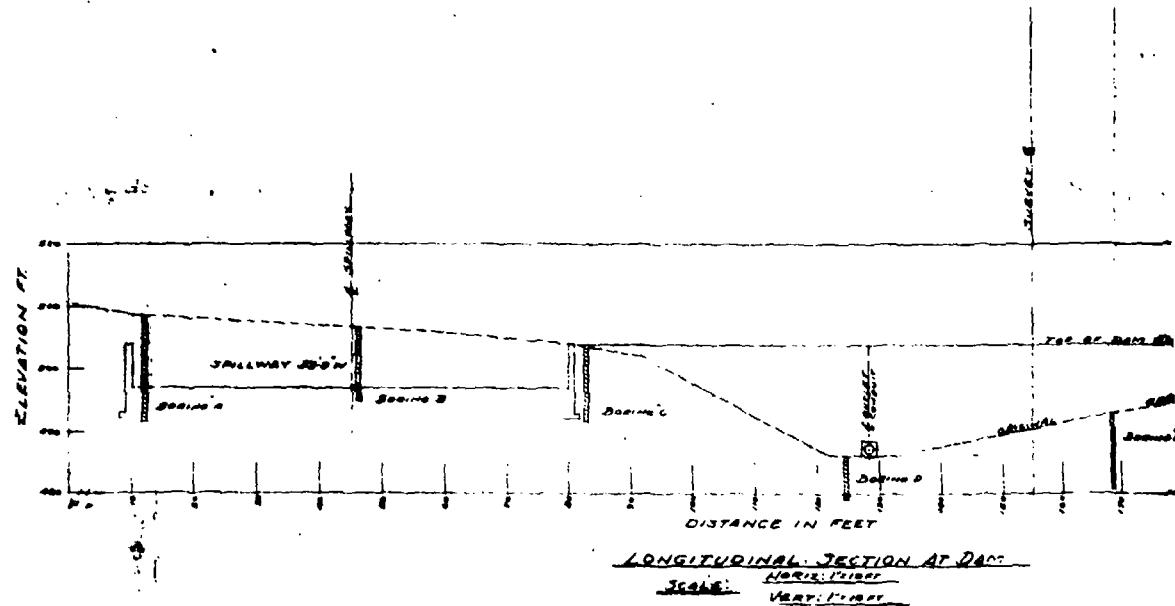
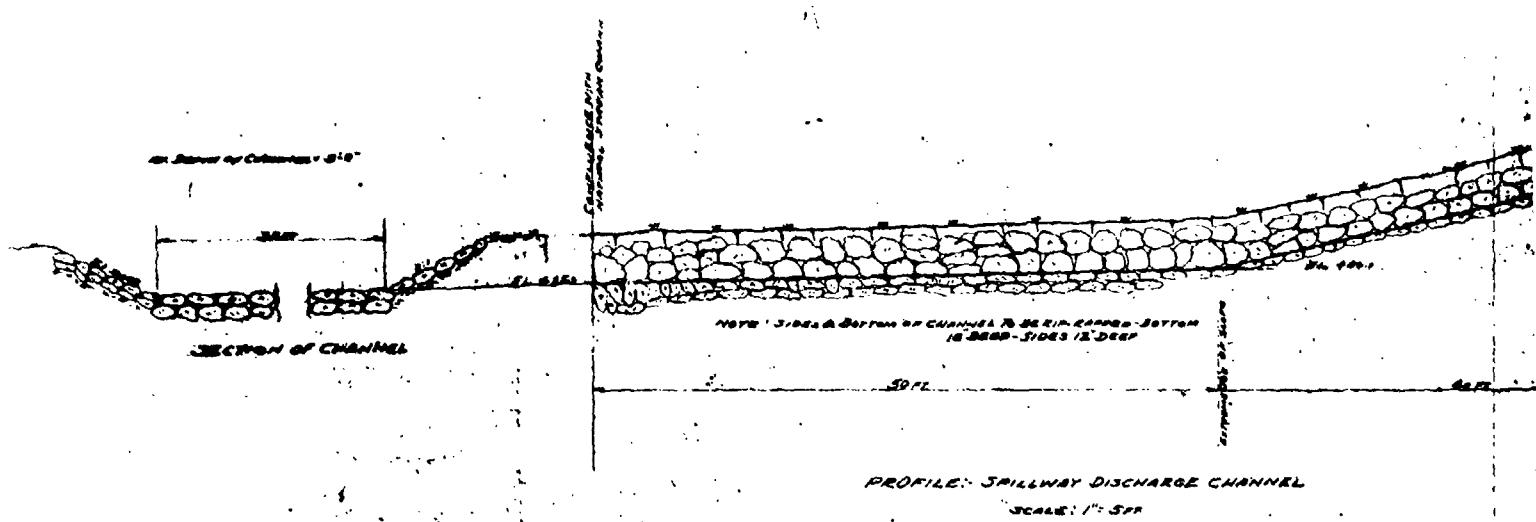
SHEET NO 3 of 4

PHASE I INSPECTION REPORT
NATIONAL DAM INSPECTION PROGRAM
ROSS DAM
BRUCE E. & NANCY W. ROSS

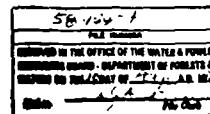
JULY 1981

PLATE E

THIS PAGE IS BEST QUALITY PRACTICAL
THIS COPY FURNISHED TO DDC



| DEPTH | SECTION OF SOIL | TYPE OF SOIL | REMARKS |
|-------|--------------------|--|---------|
| 4 | 0'-1' | STONY LOAM - 10% COARSE FRACTION | |
| 4 | 10'-30' | CLAY-SAND-LOAM - 20% COARSE FRACTION | |
| 4 | 30'-60' | STONY CLAY - 20% COARSE FRACTION | |
| 4 | 60'-110' | CLAY-SAND-LOAM - 20% COARSE FRACTION | |
| 4 | 110'-120' | STONY LOAM - 10% COARSE FRACTION | |
| 5 | 0'-1' | CLAY-SAND-LOAM - 20% COARSE FRACTION | |
| 5 | 10'-30' | STONY CLAY-LOAM - 20% COARSE FRACTION | |
| 5 | 30'-60' | CLAY-LOAM - 20% COARSE FRACTION | |
| 5 | 60'-110' | CLAY-SAND-LOAM - 20% COARSE FRACTION | |
| 5 | 110'-120' | STONY LOAM - 10% COARSE FRACTION | |
| 6 | 0'-1' | CLAY-SAND-LOAM - 20% COARSE FRACTION | |
| 6 | 10'-30' | CLAY-SAND-LOAM - 20% COARSE FRACTION | |
| 6 | 30'-60' | STONY LOAM - 10% COARSE FRACTION | |
| 6 | 60'-110' | CLAY-LOAM - 20% COARSE FRACTION | |
| 6 | 110'-120' | STONY LOAM - 10% COARSE FRACTION | |
| 7 | 0'-1' | CLAY-SAND-LOAM - 20% COARSE FRACTION | |
| 7 | 10'-30' | CLAY-SAND-LOAM - 20% COARSE FRACTION | |
| 7 | 30'-60' | STONY CLAY-SAND-LOAM - 20% COARSE FRACTION | |
| 7 | 60'-110' | CLAY-LOAM - 20% COARSE FRACTION | |
| 7 | 110'-120' | STONY LOAM - 10% COARSE FRACTION | |
| 8 | 0'-1' | CLAY-SAND-LOAM - 20% COARSE FRACTION | |
| 8 | 10'-30' | CLAY-SAND-LOAM - 20% COARSE FRACTION | |
| 8 | 30'-60' | STONY CLAY-LOAM - 20% COARSE FRACTION | |
| 8 | 60'-110' | CLAY-LOAM - 20% COARSE FRACTION | |
| 8 | 110'-120' | STONY LOAM - 10% COARSE FRACTION | |
| 9 | 0'-1' | CLAY-SAND-LOAM - 20% COARSE FRACTION | |
| 9 | 10'-30' | CLAY-SAND-LOAM - 20% COARSE FRACTION | |
| 9 | 30'-60' | STONY CLAY-LOAM - 20% COARSE FRACTION | |
| 9 | 60'-110' | CLAY-LOAM - 20% COARSE FRACTION | |
| 9 | 110'-120' | STONY LOAM - 10% COARSE FRACTION | |



PROPOSED DAM
FOR BRUCE AND NANCY ROSS HERRICK
TSNRP - SUSQUEHANNA COUNTY, PA
REV JULY 1969
L F BURLEIGH, PE

SHEET NO. 1 OF 4

THIS PAGE IS BEST QUALITY PRACTICABLE
DAM ONLY FURNISHED TO DRG.

PHASE I INSPECTION REPORT
NATIONAL DAM INSPECTION PROGRAM

ROSS DAM
BRUCE E. & NANCY W. ROSS

JULY 1981

PLATE E-10

APPENDIX F

GEOLOGY

ROSS DAM

GENERAL GEOLOGY

Bedrock at Ross Dam is gray to red siltstone and shale of the Catskill Formation. It is well bedded in thin to medium beds with closely spaced, well developed joints. Siltstone is moderately resistant to weathering and breaking along joints and bedding fractures into tabular and blocky fragments. Glacial till exists at the site and is at least 5 feet thick in the valley.

Legend

(Bedrock)

Dck CATSKILL FORMATION UNDIVIDED - Succession of grayish-red sandstone, siltstone, and shale, generally in fining-upward cycles; some gray sandstone and conglomerate.

